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THE WEEK IN IRON CIRCLES.

General Features. The great crop movement has begun, and its effects are already felt in the employment of idle rolling stock capacity and enlarged traffic on the railroads. That a car famine will be the result is the lesson taught by previous experience, and iron manufacturers are, in some instances, anticipating the same by hastening shipments on contracts. Nothing has occurred to change the general tendencies of the market described in recent reports. As nearly all of the Southern furnaces are heavily sold ahead, there has been but little pressure to sell. As production increases, demand also broadens out so that there is no accumulation to speak of anywhere. With easy money markets and all appearances of trouble removed, the way would be clear, undoubtedly, to an advance in prices, but those conditions do not exist, and are not likely to for several weeks to come. Outside of a round lot of Southern car wheel iron placed with one of the Western companies, no sales of any magnitude have been reported at Louisville. The holding off from buying does not seem to be occasioned so much on account of prices not being considered low enough, as that the amount of orders in hand for finished material is so small as to cause consumers of pig to wait for the present to see whether their orders will be sufficient to justify their purchasing the usual quantity for future delivery; those who have been so fortunate as to make contracts for a fair portion of their product for the next three or four months have supplied themselves with what pig metal they will probably need during the remainder of the year. Furnaces do not appear to be very uneasy over the situation, feeling that it is but the usual mid-Summer dullness now prevailing, and that this will be followed by active trading and a large demand during the Fall with perhaps slightly better prices, and now that the July interest has been paid there will be little need of selling at an extremely low price in order to realize quick returns. The activity at Detroit, which we noted in our report of last week, was fully maintained straight up to the end of the month, and the volume of business in Lake Superior charcoal in June will certainly be a large one. There is, however, a very uncomfortable monotony in low prices. The increased output of all of our furnaces, which is the cause of the overstocking this year of Lake Superior charcoal iron rather than a lack of demand, which certainly has been about as much as in previous years, has caused a piling up of stocks of a sufficient amount at the furnaces to make the sellers fearful of losing orders by advancing prices. This is particularly true of what may be termed Summer furnaces, whose stocks must necessarily be moved during the Summer months, or else in many cases carried over until the opening of navigation the following Spring. But with the prospects of a large crop and with the continued demand and inquiry that there is to-day, it is to be hoped that some better prices may be asked and obtained a little later on. Northern coke irons are showing considerable activity in our local market and obtaining some good-sized orders. We hear of no transactions in Southern iron, of record, during the past week. Altogether, the trade may be said to be fairly good, as far as demand is concerned, at nominally low prices. The Chicago market shows little in the way of features of special interest. Moderate buying is only going on, this being divided among Northern cokes, Southern cokes and Lake Superior charcoal, orders ranging for the most part from 500 tons down. It is reported that one or two good-sized lots of Lake Superior charcoal have been sold during the last week to one of the leading malleable concerns for the purpose of completing their season's contracts. Prices remain on about the same basis as has been ruling for the last fortnight. On Southern coke some companies are very firm on the matter of extended deliveries, while others are found ready to make present prices on contracts running well into next year. Lake Superior charcoals are being held at $18, Chicago, with the exception of one or two furnaces which are still in need of orders; price is being cut by these. Buying at Buffalo has been considerably restricted during the past week, due in part, at least, to inventorying, which is apparently quite general among foundries at this time of the year. There is evidence of a little more pressure to sell, but stocks at furnaces and foundries are light. Consumption is so very small that it would look as though any change would be toward an increase after the "shut down" attending our national holiday is over.

The Local Situation. There has been a combination of circumstances this week that did much to retard business, so that little can be said either in the way of transactions or of gossip. Quite a good many of the people interested in the iron and iron ore lines went out of town to spend the Fourth and have not returned as yet, and several of the leading men in these lines seem to have lost all interest in the market, and have temporarily retired to enjoy a vacation. From the head of the lakes considerable confusion is reported in the ore shipments, and the vessels get very poor dispatch. Nobody can tell within half a million tons just how much ore has come down by lake thus far, but there are some who claim that the falling off this year over the corresponding season in 1890, is fully two million tons. Freights, which were decidedly bullish last week, are weak at this writing, but will receive considerable stiffening as soon as the Southwestern grain crop reaches the Western points of shipment. Some Bessemer ores were sold this week at the prices that have governed for the past month, the producers seeing no way out of the claims upon them by their customers. It had been resolved by some of the ore men to curtail their mining operations, and to limit them to the lowest possible output, but they were met by the problem of the future, and, having been in the market when prices were good, they could not well get out of selling now, at the lower quotations. There is, however, quite a difference in opinion among the dealers as to the price of non-Bessemers, some of them asking an advance of twenty-five cents, based on the recent increase of ten cents in vessel rates, while others dispute the justice of the advance. Among the ores sold this week, at the advance, were some of the Negaunees, and some fair grades of Gogebic hematites. The pig iron market, although fairly active, is quiet. Most of the larger consumers have covered their immediate wants, and as the furnaces are by no manner of means anxious to sell more of their future product at this time, the advance they ask is sufficient to retard any great buying movement in the local market. It is quite certain, however, that iron bought for October and November delivery is fully half a dollar higher than spot iron, and the demand for Bessemer has considerably stimulated the price. The hardware jobbing trade, which has been more than good in the country at large thus far, has dropped off this week, as is usual at this season of the year. Metals of every description are strong, copper reporting a material advance in the raw form as well as in the products into the manufacture of which it enters. Pig tin and pig lead are also very firm. Tinplate is hardly affected as yet by the change in the tariff that went into effect last week, the result having been largely discounted during the past few months. The purchases abroad have been exceedingly heavy, one Liverpool firm quoting the American purchases in this line this Spring at nearly four million dollars. The latest quotations in this market are: copper (Baltimore), 12¾c.; lead, 5c.; pig tin, 22c.; spelter, 5¼c., and antimony, 19c.

FARQUHAR'S FALLACIES.

The case of Mr. A. B. Farquhar, a manufacturer of ploughs, etc., at York, Pa., serves to illustrate anew the habit of recklessness in regard to truth which appears to fasten itself upon the advocates of Free Trade in this country, especially the comparatively few manufacturers who are so blind to their own and their neighbors' interests as to ignore the very plain teachings of events, and array themselves on the side of the industrial enemies of the nation. Mr. Farquhar has been quoted far and wide as stating that his firm exported about one-half its products, and at prices 5 to 10 per cent. lower than those received in this country, and that a manufacturer who can sell abroad has no use for protection, except as a means of extorting a higher price at home.

So long as the parrot anti-Protection press was allowed to chant these charges unchallenged there was high glee all along the Free Trade line; but they counted without their host when Colonel Albert Clarke, Secretary of the Home Market Club, of Boston, took the matter up. Colonel Clarke instituted inquiries at York, with the result of completely shattering Mr. Farquhar's case. Instead of his exporting 50 per cent. of his product, it was found that he exports only 30 per cent. It is also asserted that he exaggerated the cost of his material fully 33 per cent. Moreover, it appears that he imports some of his material and draws back 99 per cent. of the duty, and that the average wages of his hands are only $1 per day. Finally, his fellow manufacturers of York have taken the matter up and come out in this scathing and overwhelming answer:

The undersigned manufacturers in York, Pa., believe that without a protective tariff few manufacturing industries could have been built up in this country, in the face of the expressed determination of established foreign concerns to possess the market and prevent domestic competition. We also believe that we could not now continue to pay wages much in advance of those paid by foreign competitors, unless those competitors were compelled to pay the difference into the United States Treasury before being permitted to sell their goods here. We believe, furthermore, that the case of an American manufacturer selling a portion of his goods, which are largely of special design, in foreign markets at prices confessedly lower than those at home, so far from proving that protection is no longer needed, shows how an assured prosperity at home enables a producer to develop business abroad. It does not prove that he could sell his entire product at foreign prices and continue to pay American wages. We know that we could not, although York is much more favorably situated for economy in production than most American cities; and, moreover, we believe that the two provisions in the new tariff for a rebate of 99 per cent. on imported materials for manufactures exported, and for a reciprocity with other countries in the dissimilar products peculiar to each, afford us a much greater advantage in foreign markets than we could get by Free Trade, and while doing this they both increase business and lessen the cost of living at home.

Could there be a more convincing statement of the case than this? A few such facts are worth a bushel of wild assertions of the Harter-Farquhar crowd.

AN INTERESTING IRON SEMI-CENTENNIAL.

July 4, 1891, marked the semi-centennial anniversary of a most important event in the history of this country. At 5 o'clock in the afternoon of July 3, 1840, the first anthracite furnace ever erected in the United States was blown in, and on the following day the first run of iron was made. The pioneer anthracite iron maker was David Thomas, born in South Wales, November 3, 1794, and died in Catasauqua, Pa., June 20, 1882, in the eighty-eighth year of his age. The company to whom credit is due for this first achievement in iron-making was the Lehigh Crane Iron Company, whose successor, the Thomas Iron Company, has since become a leading factor in the iron business of the country. Mr. Thomas came to the United States in 1838 at the earnest solicitation of the Lehigh Coal and Navigation Company, and but for his indefatigable labor the advent of anthracite pig iron manufacture would doubtless have been delayed many years. The first furnace was forty-two feet high with twelve feet bosh. It was operated by the breast-wheel twelve feet in diameter and twenty-four feet long. The motive power was the water of the canal. The furnace remained in blast until its fires were quenched by the rising waters of the great flood of January, 1841, a period of six months, during which 1,088 tons were produced. The largest output for one week was fifty-two tons. Now the Crane Works have furnaces which produce in a week as much and better iron than the old furnace did in its first six months. The old furnace was blown in again after the freshet on May 18, 1841, and then remained in blast until August 6, 1842, producing in that time 3 316 tons of pig iron.

Of course, it must not be understood that there had been no previous attempts to make anthracite iron, though Mr. Thomas was the first to succeed in the effort. As early as 1820, in Wales, Mr. Thomas with Mr. George Crane, one-third owner of the Ynlscedwld works, began to experiment with anthracite, burning it in small proportions with coke, but not with commercial success. In 1825, he had a small furnace built, twenty-five feet high, with nine feet bosh, which was put in blast with coke and increased amounts of anthracite, but the experiments were not promising and the effort was abandoned. In 1830, the same furnace was enlarged and attempts were renewed to discover the secret of success, with no better results than before, and the unprofitable work was abandoned. In 1825, Joshua White and Erskine Hazard, both of Philadelphia, having successfully used anthracite coal in the manufacture of iron wire at their mill, near the Falls of Schuylkill, erected a small furnace at Mauch Chunk for the purpose of experimenting as to the practicability of smelting iron with the coal. Among other methods tried was that of passing the blast through a room heated as hot as possible with common iron stoves. They soon abandoned this furnace and erected a new one in which they used charcoal exclusively, thus acknowledging their effort to have been a failure, though it contained the unrecognized suggestion of the method afterwards adopted. The true solution of the difficulty was furnished in 1834 by one Neilson, manager of the Glasgow gas works, who discovered the use of the hot blast. In 1836, Thomas went to work with Crane's consent and built ovens for heating the blast. The result was a success in a far greater degree than the two men had dared to hope after their many disappointments, and from that time on there was no difficulty in making iron with anthracite as fuel. From 1,500 tons of anthracite pig produced in 1840 to 10,000,000 tons produced in 1890—what changes this simple comparison implies!

TWENTY YEARS HENCE.

The *Colliery Guardian*, of London, one of the strongest of English trade papers, possesses among other commendable characteristics, an intelligent interest in the industrial progress of the United States. In a recent review of the American iron trade in which it speaks with enthusiasm of the wonderful advancement of the past twenty years, especially in the development of the South, it says:

The opening up of the South for metallurgical purposes affords the main explanation of the remarkable development of American metallurgical industry during the last ten or twenty years; and it is certainly a wonderful thing that the increased production of American blast furnaces and American rolling mills should have been so readily absorbed as it has been without involving any overwhelming decline in prices. Great as the progress of American metallurgy has undoubtedly been since 1870, there is every probability that it will work out still more remarkable results by 1910. The United States are still adding to their population at the rate of 100,000 per month; and even if population does not accumulate more rapidly than this, when the first decade of the next century approaches its close, the American Union will have 90,000,000 inhabitants or thereabouts. It is impossible that an addition of 25,000,000 to the existing population of the United States should not greatly increase the demand for all kinds of metallurgical products, more especially as it is believed that during the next twenty years American agriculture will find itself supported by better prices than it has been obtaining of late. We are not, however, so much concerned about the probable position of American metallurgical industry in 1910 as with the prospects more immediately in store for it, and we can but repeat our conviction that the American iron and steel trades are likely to benefit in 1891-2 from the great national blessing of agricultural abundance.

Though less widely heralded, the progress of other sections of the country, notably the Central West, has been truly marvelous, and the *Guardian* certainly cannot be charged with undue prejudice in in our favor in painting so glowing a picture for the future.

WE quite agree with the *Iron Age* as to the absurdity of the decision arrived at by the World's Fair directors, not to allow any manufacturing in the Manufactures Building. "Many machines," says our contemporary, "can, of course, be exhibited motionless and visitors will not expect to see them in operation. Farm machinery is a case in point. There are other machines, however, and perhaps they are in the great majority, which must be shown in motion to enable visitors to get a proper conception of their method of operation or of the principles involved in their construction. Under such a ruling as this the Manufactures Building would be apt to lose exhibits of a great deal of very interesting machinery, as exhibitors would not send two sets of machines—one for show in the Manufactures Building and one to be put in operation in some other building."

COMPRESSED air as a motive power, which is already used to a large extent in Birmingham, England, is to be introduced at Elwood, Pa. The water power of the Connoquenssing creek is to be used for producing compression, and the power thus generated is to be sold to manufactories in quantities to suit.

THE BUSINESS STATUS.

To say that business on the Stock Exchange is apathetic, is to utter a commonplace. The cause of this dullness is not clearly known, and its longevity it is impossible to forsee. Investors seem to have retired permanently and what little trading goes on is transacted between members who are satisfied with the one-eighth and one-fourth, which characterizes the present fluctuation of the market. The difficulty is not that the public has no funds wherewith to purchase stocks, for the recent placing of land company bonds and industrial shares, proves the contrary. It seems to be a question of profit, rather than one of a lack of confidence. What greater inspiration to confidence could there be than that furnished by the crop prospects of the West? Neither the assurance of dividends nor the certainty that shares must rise when the crop movement begins, has been a sufficient inducement to investors. The latter prefer to invest in development companies, and the shares of industrial concerns, because these hold out the prospect of larger returns. So great has this displacement of capital become, that it now embraces every status of the capitalistic class. Savings bank deposits even have fallen off, and the money has gone into small industries, building associations, various bond investment schemes, industrial stocks and land companies, for the creation of new-fangled securities is keeping pace with public avidity for them. As we go to press, however, we notice the first symptoms of a reaction on the stock exchange, but it does not promise much. The Granger stocks, which should have felt the inspiration of the crop prospects all along, are at length inclined to rise.

Theoretically, the stock exchange is regarded as a barometer of the condition of the business world. If this claim can be substantiated, our business interests are in a state of phenomenal dullness. We are not inclined to accept this view. On the contrary there are many new enterprises projected and plenty of capital is at hand, or so it seems, to put them in operation. In the West and South bodies of substantial merchants and capitalists are organizing to give impetus to various commercial projects. In the South, it is true, that the establishing of new manufacturing plants has fallen off somewhat, during the half year now at end, but such as have been founded appear to be on a sound basis. There is a general absence of serious strikes, and the sentiment among manufacturers is that the Autumn business will employ all hands at good wages. There is, however, a gloomier view of the situation in the record of failures for the last half year. The record shows an increase as compared with the first half of 1890, and the aggregate exceeds the record of the first half of the last nine years, except 1885. The total number of failures in the past six months was 6,037. and the total number in the first half of 1885 was 6,106. It is a matter of interest to note how these business casualities are distributed. *Bradstreet's* shows that the Western States press the Middle States closely in the number of failures, the total for the Middle States being 1,451, and for the Western States 1,302. The Middle States reported $31,662,797 of liabilities and $15,651,853 of assets. In the Western States the liabilities were $21,388,470 and the assets $12,101,765. The Southern States had 1,134 failures in the last six months, with $17,186,274 of liabilities, as against $10,124,000 of assets. The Pacific States escaped lightly with but 565 failures, only $2,373,000 liabilities, and $2,095,892 of assets.

The banks throughout the country are strengthening their reserves. We hear from all sections that there is still a good deal of diffidence in making time loans, and that bankers are keeping as much cash in sight as is consistent with the interests both of stockholders and the public. The outflow of $70,000,000 of gold could not be effected without influencing our banking interests. The uncertainty which the banks feel concerning this gold efflux is heightened by doubt as to the future monetary policy of the government. Of course this apprehensiveness among the banks is felt chiefly and most strongly in the monetary centers. The country banker, seeing the reserves in the centers rise, is quicker to render accommodations to customers. The New York *Chronicle*, taking a less hopeful view of the present conditions, says: "As gold goes out of the country money gets easier here and at most other of our monetary centers. We export nearly $70,000,000, and after losing it all the bank reserves of the East and West are larger than they were when the overflow began. There seems to be a disposition to point to facts like these as an evidence of strength in our financial situation, but they are instead an evidence of weakness, and tend to locate that weakness. Depression in business causes the increasing accumulations of currency, and gold exports are the reason for the depression. Had there been no exports of gold, trade would have been thriving now, and the money which has accumulated in bank would have been in active use. Gold exports cannot act as a business deterrent unless there is some unsoundness (which the exports affect) in our trade or in our currency, and if it is in our trade it will be disclosed by a striking increase in failures." —[American Banker.

A Twelve-inch Steel Gun Finished.

The first 12-inch steel gun made in the United States has been completed at the Army Gun Foundry or Watervliet Arsenal, West Troy, and has arrived at Sandy Hook Proving Ground to be tested. It is the largest steel gun ever built in this country, but there are 12 13-inch guns under way for the three battle ships of the Navy—the Indiana, Massachusetts and Oregon. The 12-inch Army gun is the first of 16 of its type ordered by the Government and has been building since 1888. Although it was necessary to send abroad for the largest forgings, owing to the fact that substantial progress had not been made in the manufacture of steel forgings in this country, it will not be necessary in the future to do so for either the army or navy, for the reason that American steel manufacturers now have the furnaces and mechanical appliances to produce the largest forgings.

The tube and jacket forgings for the first 12-inch steel gun were purchased from the works at Creusot, France, and the remaining forgings were purchased from the Midvale Steel Works, Pittsburg, Pa. The finished gun is 440 inches long, the length of the bore being 408 inches, and the total weight of the gun is 52 tons. It will be fired with a charge of 440 pounds of powder, sending before it a projectile weighing 1,000 pounds. Each charge will cost $260. The initial powder pressure will be 16½ tons to the square inch, and the initial velocity of the projectile will be 1,949 feet per second, the muzzle energy being 26,000 foot tons. At the muzzle this projectile will penetrate 32 inches of iron, or 20 inches at a distance of two miles.

The gun is to be mounted on the pneumatic disappearing gun-carriage at Sandy Hook, and will receive the statutory test of 250 firings. Lieutenant Harry Taylor, of the Corps of Engineers, has had charge of the "hole in the ground" for the disappearing gun-carriage, but there are many incredulous brains in the army as to the efficacy of this new gun-carriage, but as patents for these new ideas in gun-carriages are issued every few days, one may be found that will satisfy all. As a rule, the carriages are so complicated and unwieldy as to be practically unserviceable.—[New York Tribune.

BESSEMER IRON ORE IN CALIFORNIA.

Mr. C. L. Hubbs, a mining engineer of Albuquerque, N. M., who is familiar with the iron ore deposits of the Pacific slope, writes the *Bulletin* of the American Iron and Steel Association:

Situated in California, about 150 miles east of Los Angeles, and 12 miles from the track of the Atlantic & Pacific Railroad, is a body of magnetic iron ore of great magnitude and purity. The ore lies in a well-defined contact vein, between walls of granite and syenite, and is from 400 to 600 feet in width by 3,000 feet in length, and apparently of great depth. In places along the hills through which the vein runs it rises to nearly 100 feet above the surrounding rock in great masses of inky blackness, a fresh fracture upon which glistens like broken steel. The ore is quite accessible, and can be mined at very little expense. As shown by analyses the ore is very pure. The determination by leading chemists of this country of the objective contents is as follows:

	Per cent.
Iron	68.84
Manganese	0.038
Phosphorus	trace
Sulphur	0 078
Titanium	0.20

The silica runs below 2 per cent., and the chief chemist of the United States Geological Survey puts the titanium at a trace, and pronounces it a "very pure ore."

A Pittsburgh engineer, posted on the cost of fuel, etc., places the expense of producing a ton of pig iron, at a point in California convenient to this iron ore deposit, at $13 75 per ton, on the basis of ore carrying 50 per cent. of metallic iron. The property does not produce any ore running under 60 per cent of metallic iron. Charcoal would be the fuel to be used, and it is available in sufficient quantity.

The present consumption of pig iron in California would absorb the output of a blast furnace producing 100 tons of iron daily, and the prices now paid in that State for pig iron, varying from common coke to charcoal iron range from $26 to $35 per ton, which prices would admit of a clear net profit of from $8 to $17 per ton. The consumption of pig iron is also rapidly increasing, thus presenting a tempting field for our Eastern iron producers, who are realizing less than two dollars per ton on their output.

There is no other such body of ore having the dual qualifications of purity and quantity in the far West, and no other which could compete with this were it developed. That this deposit is not actively worked lies in the fact that the owners of the property have not the means at their command to make it available.

The Welsh Tin-Plate Trust.

If anything were needed to convince the American people that it is the height of folly to remain absolutely dependent upon a foreign producer for an article in common use which they can themselves supply, it has certainly been afforded, and in abundance, by the conduct of the Welsh Tin-Plate Trust since the passage of the McKinley bill. One would suppose that these Welshmen, who have been growing rich for generations upon the enormous profits of their American sales, who exist commercially for the American market, and who, without this market, must go out of business—one would think, instead of abusing and affronting their American customers, that these Welshmen would adopt a policy of conciliation. We consume three-fourths of their output. We have builded their city, developed their mines, created and maintained their industry. In 25 years we have paid them $320,000,000. If there is any community bound by every obligation to treat the American people with consideration, it is the tin-plate makers of Swansea.

But it has been decided by these people that the Americans in undertaking to make tinplates at home, are guilty of an act of impudent hostility which must be met in kind. Instead of being impressed with their duty to us, they are convinced that the duty is ours, and that to talk of making their product here is to talk something that savors of treason, something that must be resented by acts of repression, and that justifies them in resorting to all kinds of extortion. It is a well-known fact, in proof of which conclusive evidence was presented to the committees of Congress last year, that they have all along been charging us from 60 to 100 per cent. more than a fair price for their wares. Senator Aldrich, in his masterly speech closing the tariff debates in the last Congress, presented a long and most interesting table showing that the Welshmen, though producing at a rate of wages almost beggarly, gave us none of the benefit of this cheap labor, but, fixing prices through a trust, charged us as heavily as if they had been operating upon the American wage system. In view of this fact the passage of the McKinley bill, even if its new tinplate duty went into immediate effect, afforded no honest excuse whatever for raising their prices.—[New York Tribune.

WORLD'S FAIR NOTES.

Thirty acres in the northern portion of Jackson Park have been reserved for sites for the State buildings. The ground has already been apportioned among the States, consideration being had for the size and importance of each and the amount it will probably expend upon its building and collective exhibit. The entire space will be artistically divided by beautiful walks and driveways.

A herd of 85 buffalo will be exhibited at the Fair.

An enterprising Nebraska man says that he will take to the Exposition a crowd of 50,000 school children from Omaha and vicinity. He proposes to have each car load in charge of a teacher, and he has already begun negotiations with the railroads for special rates and special trains.

At a meeting of representatives of various religious, benevolent and reformatory organizations, held recently in New York for the purpose, a committee of five was chosen to arrange, if possible, for the erection of a separate building at the Exposition, in which can be shown the methods and results of every description of religious, missionary and philanthropic work in this country.

The Exposition officials and those of the city of Chicago, have agreed upon police and fire arrangements for the Exposition grounds. Completely equipped police station and fire engine house will be erected at once, and the city will furnish them with a full complement of apparatus and men.

An appropriation of $150,000 has been made by the Exposition Directory, for the expense of ceremonies attending the dedication of the buildings, October 12, 1892. The ceremonies will be extended through several days, and some 15,000 militia and U. S. troops, it is expected, will participate.

The fine arts exhibit, it is now definitely and finally settled, will be at Jackson Park, the strong effort which was made to have it located in the Lake Front Park having been defeated in the Directory. The fine arts building, which will cost $600,000, will stand in the northern portion of the grounds, and will be nearly surrounded by the buildings of the several States of the Union.

A permanent art place will be built also in Lake Front Park, towards the erection of which the Exhibition will contribute $200,000. During the Exposition this building will be used by the World's Congress Auxiliary for the holding of some of its numerous congresses. After the Fair the Chicago Art Institute will take possession of it and make it the home of a permanent art collection.

One hundred thousand soldiers gathered from the regular army and national guard would make an effective feature of the World's Fair, so Gen. Miles thinks. The General has suggested such a display in a letter to President Thomas W. Palmer, outlining the distinguished soldier's views on the Exposition.

Gen. Miles would have the World's Fair illustrate the development of the country from the geological era, dividing the displays historically into four periods. The military feature is suggested in addition to this general historical exhibit, and Gen. Miles thinks, would be peculiarly appropriate as demonstrating the strength of the nation's citizen soldiery. It would gather together members of the national guard from various States, upbuild a national patriotic spirit, and unite the organizations of different States in a spirit of fraternity. Aside from the good results thus obtained the officers and troops would want to come to the Fair anyway, and most of them would prefer to come to such a mobilization as suggested.

An exhibit from Alaska will be collected under the auspices of the government's Indian bureau and geological department, provided Congress appropriates money for that purpose, as it is expected it will.

Commissioner Hershfield, of Montana, has asked of Director-General Davis that 200x300 feet of space be reserved for Montana. He said that $100,000 would be spent on the building alone, and that the State contemplated constructing a mountain to illustrate placer mining, miners' camp, geyers waterfalls and other adjuncts of mining regions.

As soon as they can be prepared 100,000 copies will be issued of a fine water color lithograph representing a bird's-eye view of the Exposition buildings and grounds. This work will appear in 16 colors. Charles Graham, the artist of *Harper's Weekly*, has made the sketches. These lithographs will appear in public places throughout the world.

Kwong Wo Chiong, a Chinese merchant in Hong Kong, has applied for space for an exhibit of Chinese goods. Applications for space are getting to be very numerous, and already many have been sent in from foreign countries.

McKeesport, Pa., has decided to make a special exhibit at the Exposition, and is now engaged in raising money for that purpose. The *News*, of that city, inaugurated the movement, and the common council selected a committee to make arrangements. The industries of McKeesport are allied to those of Pittsburgh in character.

Lieut. Little, of the Navy Department, has sailed for Europe to complete the plans for reproducing the caravels which formed the fleet of Columbus. He carries letters of introduction from the State Department to Minister Grubbs and other representatives of the United States abroad. The Spanish Minister has also given him letters to various officials at Madrid. Before going to Spain Lieut. Little will visit the museums at Paris, London and The Hague, as valuable historical material can be obtained at those museums. The Lieutenant has consulted with ship-builders in this country and they have advised him that the best way to secure a reproduction of the Santa Maria, the Pinta and the Nina will be to have most of the work done by the Spanish or Italian ship-builders. The modern American vessel is so vastly different from the fleet of Columbus that ship-builders here have found it difficult to plan a reproduction. They have all agreed, however, that the methods in vogue abroad, where ship carpentry has been handed down from generation to generation, will produce results in keeping with historic accuracy. Caravels will necessarily be given a smaller draught than the original vessels of Columbus, because they are to pass through the Welland Canal, but in other respects the reproduction is likely to be a faithful one.

RIVET BEARINGS.

There is, probably, no matter in structural ironwork, whether for boilers or buildings, that is more obscure than the value of rivet bearing; it is a subject upon which careful experiments can throw but little light. About the time the Britannia tubular bridge was built, an experiment was tried to prove whether the strength of a riveted joint depended upon the resistance of a rivet to shearing or the friction of the plates riveted together. The rivet holes were made oval, and it was shown that the strength of the joint depended upon the frictional resistance of the plates to sliding motion. As this was not disputed, some of the leading theoretical writers of that time took the matter up, and published formulæ based upon the tensile effort of the rivets in cooling. One author—Mr. Latham—showed this to be 24 tons per sectional square inch of rivet area. At that time no rivet would stand more than 21 tons; and the fact is that the metal stretches as soon as the plates are drawn together.

This question is complicated with another, and that is the compressive resistance of the material upon which the rivets bear. When two or three thicknesses of plate are riveted together, this has been found to be as much as 40 tons per square inch of bearing area in Farnley plates, the rivets being made of Low Moor iron; and this accounts for the endurance of iron bridges, which, as a rule, have a very insufficient allowance of bearing area, especially in the web connections with the flanges. If, for instance, we have a rivet seven-eighths of an inch in diameter connecting two angle irons to a girder web, the ratio of shearing area to bearing area on the web is as 600 to 328, and the fact that webs under such conditions do not fail is explained by the support given by the enclosing angle irons. If the bearing surface yields, the metal behind it must bulge, and if such bulging is prevented the bearing resistance is enhanced. This supplementary resistance is supplied by the tensile strength of the rivet in the direction of its axis, and then we find that the stresses upon rivets are really of a complicated character.

There is, in the first place, a possible shearing stress; in the second, the normal stress due to contraction in cooling; and in the third, the stress upon the head due to the bulging effort. This last acts only on one side of the rivet head, and therefore tends to wring it off; hence the necessity of making rivets of material as nearly homogeneous as can be obtained to obviate the liability to crack in any direction.

In boiler work the case is different, as the joints are usually lap joints, and therefore the bulging action referred to above cannot be restrained, and the stress on the rivets is of a bending character.—[Practical Engineer London).

Crops and Business

The crops of the country are good or give excellent promise. Reports of damage in Kansas were exaggerated and the destruction caused by excessive rains and floods in Western localities will not materially lessen the grand average. There will be an abundance of small grain and hay, and corn is making fair progress. The indications are that prices will be remunerative, even should the season prove bountiful up to the highest anticipations. The coldness and lateness of the past Spring in Europe will add some weeks to the time of consumption of old stocks, and this, together with the shortages in France and elsewhere abroad, will probably make such an increased demand that all that we can spare from our abundance will be needed.

The trade in farm machinery, and in vehicles also, which was curtailed somewhat in the Spring by bad weather and the conservative disposition of farmers, especially where crops failed badly last year, has become decidedly active, and harvesting machines and other implements and goods of the season are in good demand. Inquiries for and sales of threshing machinery are unusually early and large. In fine, the agricultural situation is more satisfactory in general than it has been for many years, and the farm machinery and vehicle industries are in touch with it.—[Farm Implement News.

Reciprocity and Subsidy Favorable Tokens.

The foreign mails are accepted as an infallible index to the state of trade, and it is a fact well worthy of note that the mails to Brazil and other countries in South and Central America have never been so heavy as they have during the past three months. Reciprocity and the postal subsidy bill have evidently developed already into factors of the greatest importance as promoters of our foreign commerce, and the countries South of us are already beginning to look to us more regularly and to a greater extent to supply their multifarious and voluminous requirements.—[Farm Implement News.

Gas Fuel in Cities.

On computing the cost of converting coal into gas and conveying it in pipes from certain coal fields to London, one scheme to cost about 50 millions of dollars, figures out a saving in carriage, trading profits, and the value of residium, of nearly 35 millions of dollars a year. This is perhaps wild computation, but that our cities are to be thus supplied with gaseous fuel at no distant day no one can doubt. The Philadelphia Gas Co., at Pittsburgh, have such a plan in view, in case of the failure of natural gas, and their plant is in some respect modified with a view to this contingency.—[Industry.

The First of the Season.

Nickel Plate daylight Niagara Falls excursion, Monday, July 13th. Inquire of agents. City ticket offices 224 Bank street, 598 Pearl street and depots.

LAKE SUPERIOR MINING NOTES.

The Mutual people have temporarily supended work on section 1.

At the Harrison the crosscut has not yet struck any ore of importance, although there are many small seams of ore in the jasper. If the ore is not struck in the crosscut it is probable that drifting will be done and this failing, a greater depth will have to be attained.

The third drill hole, at the Crowell, Jones & Buell exploration, at Quinnesec, is down about 375 feet and still in graphite slates. The depth now attained is about the same as that at which the ore formation was struck in the first hole, but as the last hole is further south it is expected that the ore will be struck at a greater depth.—[Norway Current.

At the Saginaw all the stopes have been stopped, and no mining will be done until the present stockpile is disposed of. There are about $30,000 worth of ore at the mine, and the company desire to sell this before putting more money into the enterprise. Offers thus far received will no more than pay the cost of production, and at this price there is no encouragement to proceed further. They will endeavor to get what they consider the product worth, or otherwise will remain idle. The ore is a good one, and ought to sell at a profit.—[Iron Ore.

Supt. O. F. Reibel, of the Crystal Falls mine, who visited the Great Eastern property and took a general survey of the exploratory work hitherto done and the mining work now in progress, was much pleased with what he saw, and says he considers the show for a big pay deposit better than at any other non-shipping and unequipped property he has seen in the district. The writer recently visited the Great Eastern, but owing to the late heavy rains, was able to get down to the bottom of only one of the three shafts—No. 2. The outlook here is excellent. The sides and bottom of the shaft for 15 feet below the bottom of the cribbing are in good solid ore, and the drift is in like case. The mine ought to be shipping ore to-day, and would if the parties controlling it had the means necessary to properly equip it.—[Crystal Falls Clipper.

After sinking a shaft for a distance of 315 feet in the hardest kind of jasper and driving a crosscut 68 feet, the ore found some time since with the diamond drill has been reached at the Samson mine. The shaft followed the foot, the crosscut being towards the hanging. From the boring the thickness of the ore is judged at 16 feet. The point at which the crosscut finds the ore is 50 feet west of the drill hole, it being deemed advisable to go to that side in order to prevent accident from ground that might come away from above, as overhead is the old workings from which considerable trouble has resulted. The ore in the Samson where cut by the drill is a non-Bessemer, very high in iron, and one that should find a ready market for fair price in ordinary seasons. Mr. Parker has had a difficult task in placing the property in proper shape for the conducting of mining affairs, as generally follows the resurrecting of abandoned properties, especially if the product has been hematite.—[Iron Ore.

One of the oldest exploration fields in the Lake Superior district is that upon which the Iron Valley Mining Co. has been conducting explorations for some time. More or less exploratory work has been done there at intervals for 30 years, in fact were commenced very shortly after the Jackson mine was discovered. It has always been believed that the old New York vein continued on through the Iron Valley location. Something over two years ago Mr. J. Maurice Finn organized the Iron Valley Mining Co. for the purpose of continuing explorations. A shaft was sunk and abandoned a few months ago, although favorable indications of the presence of ore were revealed. Diamond drilling was commenced three weeks ago, and it is now clear that previous explorations have been too far South. The big diorite bluff on the east had pushed the ore over against the perpendicular bluff on the west side. The drill is now evidently in the hanging wall of a hard ore vein which continues diagonally across the 40 from southwest to northeast. A drill core was brought in which shows that without doubt, in a few feet farther, the bit will penetrate a clean body of hard ore.—[Lake Superior Democrat.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1891, up to Wednesday, July 1, are as shown by the appended statement:

MARQUETTE RANGE.					
Champion	2,062	Lake Superior	3,983		
Total Marquette Range			6,045		
MENOMINEE RANGE.					
Florence	15,881	Ludington	35,917		
Total Menominee Range			51,798		
GOGEBIC RANGE.					
Ashland	38,678	Germania	1,768	Ruby	384
Aurora	18,266	Montreal South	6,746	Sec. 33, South Bessemer	5,104
Colby-Tilden	6,552	Mt. Hope	12,851	Sunday Lake	4,545
East Norrie	29,289	Norrie	69,823	West Cary	17,775
Eureka	3,497	Palms	4,319		
Father Hennepin	8,653	Pabst	35,791		
Total Gogebic Range			264,048		
VERMILION RANGE.					
Chandler	53,230	Minnesota	77,389		
Total Vermilion Range			131,069		
Grand totals			452,960		

The English Iron Markets.

As to the English iron market, our correspondents, S. W. Royse & Co., of Birmingham, write under date of June 27: "After the rapid advance in the value of Glasgow warrants during April, the reaction has been very sharp. Since the beginning of this month prices have fallen about 11s. 6d. per ton, though during the last week there has been but little change, and, in fact, during the last few days there has been scarcely any business done. Middlesbrough warrants, however, after a moderate advance are now reduced to about same value as at the beginning of the month, and although shipments from that port are fair, stocks in the public stores are increasing."

THE GREAT FUTURE OF MALLEABLE IRON.

"R. W. C." writes the *National Car and Locomotive Builder* as follows

In the June number of the *National Car and Locomotive Builder* there are some remarks about malleable iron that may strike the casual reader as being correct, when as a matter of fact, they are the reverse of being true. I allude to page 91, where I find it said: "Current practice does not indicate that malleable iron has any recognized position in car construction." That remark has no doubt been drawn out owing to the complaints against malleable iron that are heard so often, and are due to the number of concerns that have entered into the making of malleable iron without having the plant or the experience to do the business properly. The best friends of the malleable iron industry sadly admit that there is a vast quantity of stuff sold for malleable iron that is little better than common cast iron, but that is not the blame of this really valuable metal; it is the blame of unscrupulous persons who offer an article for sale which is far from being what it is represented to be; and it is in no small measure the blame of the buyers who go to the cheapest market without exercising common care to see that they get what they are supposed to pay for. If the buyers would insist on making tests to see that reputed malleable iron was malleable iron, a good many concerns would soon shut up shop, but there would be fewer people talking of going from cast iron to steel.

Steel castings is a material of many promises which so far have mostly been broken. Before all things, the material for car construction must be reliable. Will any one guarantee steel castings? Experience does not point to an answer in the affirmative. No material that has ever been used for car construction has equaled cast iron for reliability to withstand the shocks and strains within its recognized strength. There is no uncertainty about iron castings when made by people who know their business. Now, malleable iron is just an extension of the good iron casting, and there is no fear of failure in making the material what it is represented to be if skill and care are exercised in its production.

The field for malleable iron in car construction is on the increase instead of not being there. The vertical plane coupler and the iron or steel brake-beam naturally call for malleable iron. The only reliable vertical plane couplers in use are made of malleable iron. If master car builders worked with a single eye to the interests of the companies they draw salary from they would make the principal truck castings of malleable iron, and thereby greatly reduce the dead weight carried. There are too many men in railroad life who do things just because their grandfathers did them. If there were more intelligent desire to find the fittest material and use it, the malleable iron industry would be one of the greatest in the land.

Some Effects of the New American Tariff.

Under the above heading, the *Iron and Coal Trades Review* (London) collects the following crumbs of comfort for its little Free Trade feast:

What the ultimate effects of the McKinley tariff bill on British trade, and the tinplate trade more especially, will be, we have yet to learn. But we are able to judge of them by the action of that portion of the tariff which came into operation in October of last year, the information being supplied by German statistics of exports to the United States in 1890. One result of the going into effect of the new tariff in the States in October last was to enormously increase exports of German goods to the United States prior thereto, at the risk of overloading the markets for such goods. The declared exports during 1890 of the districts of Frankfurt, Barmen, Crefeld, Nurnberg, Sonneberg, Mannheim, Kohn, and Aachen aggregated a total of $43,133,636, a gain of nearly $6,000,000, or 16 per cent. over 1889 Only two districts showed a falling-off from 1889, Dusseldorf and Strassburg-Kehl. This was owing to the high price of coal, which raised steel to a price at which export to the United States was restricted, and German manufacturers found it difficult to keep their footing in American markets. Perhaps the most interesting, because unexpected, feature to be found in the statistics is the result shown by comparison of the exports for the last quarter of 1890, when the new American tariff was in force, with the last quarter of 1889, when the preceding tariff was in operation, and the exports had been very large. A natural and uniform decrease was looked for, but appears not to have occurred. The actual result has been a still heavier movement in 1890 than in 1889, and an actual gain is shown in the exports, notwithstanding the new tariff. From other consular districts in Europe, like reports were received. From Austria and from the consular districts of Berlin, Lyons and Basel, similar reports furnish renewed proof of the uncertainty which may attend the operation of a new tariff.

Lathes That Turn Out Granite Shafts.

Granite columns, shafts, balusters and urns, which were formerly hewn and polished by hand, are now largely made by machinery, being turned in huge lathes, some of which are heavy enough to handle a block 25 feet long and five feet in diameter. Instead of sharp cutting instruments, the lathe tools are thick steel discs, six or eight inches in diameter, which are rotated by the stone as it turns in the lathe. In some lathes these tools will make a cut two inches in depth as they travel along the bed.

THE city of Glasgow is considering the establishment of an electric lighting system by which private buildings and the public streets shall be lighted. In this connection the gas companies in the city have made a unique suggestion in proposing that small electric sub-stations, operated by gas motors, shall be placed at numerous points.

THE HACKNEY POWER HAMMER.

We illustrate and describe herewith a power hammer, in which is embodied some new and interesting features of particular importance to hammer users and mechanics generally. It is a pneumatic hammer, and though driven with a belt, air is the power used to operate the hammer head.

The engravings represent a 300 pound hammer, a 50-pound hammer and a sectional view of a 200-pound Hackney hammer. The first of these is called the double standard and the other the single standard, the mechanism and working of each being practically the same. In the double standard at the top the forged steel crank shaft works in phosphor-bronze bearings, one on each side of the crank. The crank works in a yoke having a sliding box of bronze, the yoke being attached directly to the air cylinder below, which has a vertical reciprocating motion in the slides formed in the standards. The air, which is confined above and below the piston, to which is attached the hammer head, serves to transmit motion to it, and also to serve as a cushion at the end of each stroke. The ingress and retention of air in the cylinder is controlled by valves, operated by foot or hand. On reference to sectional view it will be seen that the larger sizes of hammers have four valves, two of which automatically admit air, as may be required to supply any lost by wastage, so that their own foundation. The workmanship throughout is of the highest character, and as all parts are interchangeable, they can be replaced at little expense, and on short notice. They are made in six sizes, from 50 to 500 pounds, ranging in weight from 2 500 pounds to 14,000 pounds. The 50-pound hammer stands 6 feet 2 inches; travel of head, 7 inches; has a 10 inch pulley driven by a 3½-inch belt, and capacity of 350 to 380 blows per minute. The largest size, double standard, stands 8 feet 5 inches; travel of head, 14 inches; has a 24-inch pulley driven by a 5-inch belt, and will deliver 200 to 250 blows per minute. The following claims are made for the hammer:

1st. It occupies less space than any other power hammer.

2d. It is self contained, and ready to run the moment it is belted up.

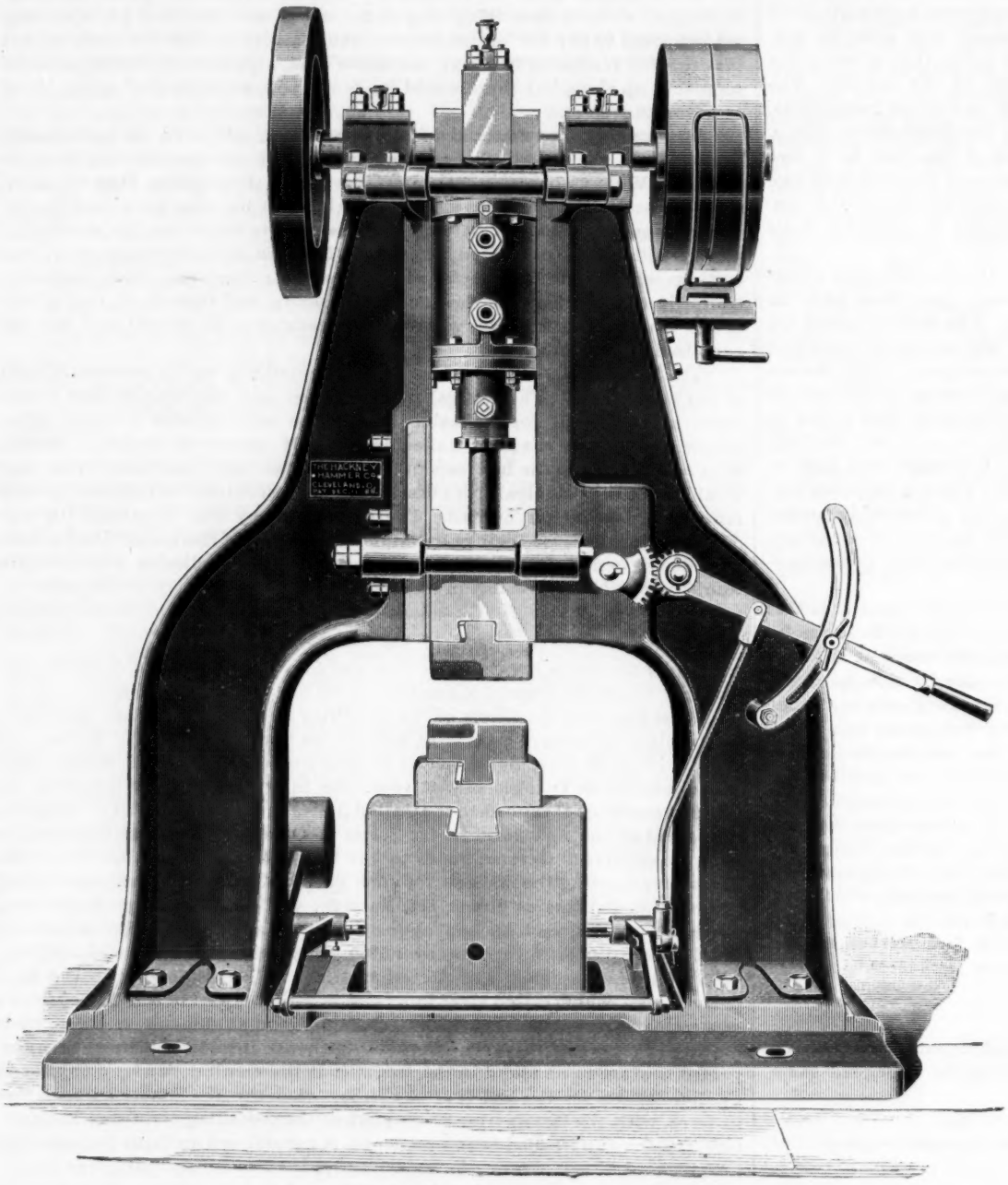
3d. It requires much less power to drive than any other hammer.

4th. It has no springs to crystallize or leather to burn. No awkward belt tighteners are necessary, and the belt is not in the way of the operator.

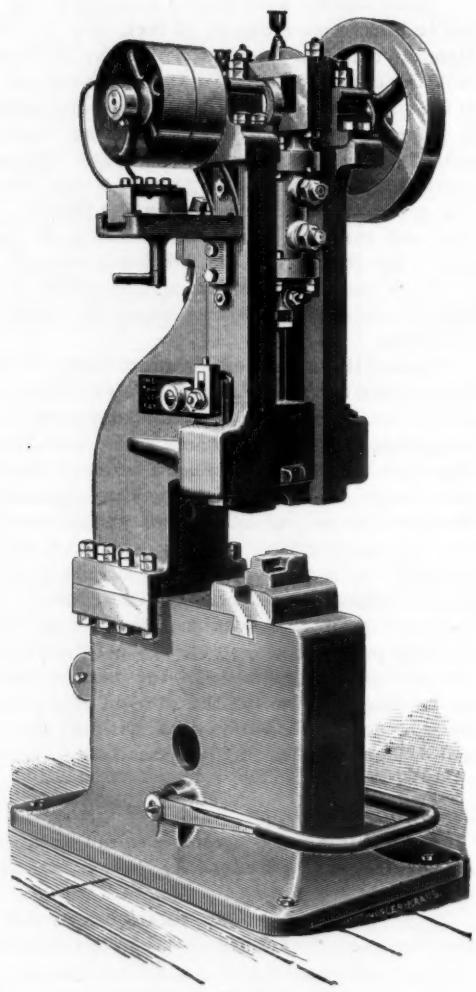
5th. It strikes a perfectly vertical blow (whether the work is thick or thin) and it is impossible to choke it.

6th. It strikes a light or heavy blow without altering the speed, and the first blow may be given full force and full speed. In this respect surpassing any steam hammer.

7th. It is so thoroughly under the control of the operator that he can



300-lb. DOUBLE STANDARD HACKNEY HAMMER.



50-lb. SINGLE STANDARD.

the stuffing box and piston need not be too closely packed to prevent it freely working. The motion of the hammer is controlled by the valves at back of cylinder, which are opened and closed by a sliding wedge connected with the levers seen on outline view. Of course, the opening of one valve by the wedge, closes the other. To illustrate, the upper back-valve being closed, the air is confined above the piston, and is forced down, the lower back valve at the same moment opened, hence, until the piston has passed this one, its momentum is unrestrained. After passing the lower back valve, the air confined below having no means of escape, is compressed, forming a cushion and serving to raise the piston after the blow. The intensity of compression, and, accordingly, the force of the blow depends entirely upon the degree of opening of the back valves. The valve action is so quick that a blow may be delivered with full force, and on withdrawal of treadle or hand pressure the motion of the hammer will be restrained, and is held suspended at the upper end so that even drop forging has been done entirely satisfactorily under the hammer without any special preparation. The cylinder and hammer head guides are adjustable to allow "take-up" for wear. The lower part of hammer in the smaller sizes is made separately, and is readily replaced in case of injury or breakage, but in the larger sizes the anvil block is separate and rest on follow the lightest touch, with the most powerful blow the hammer is capable of, and vice versa.

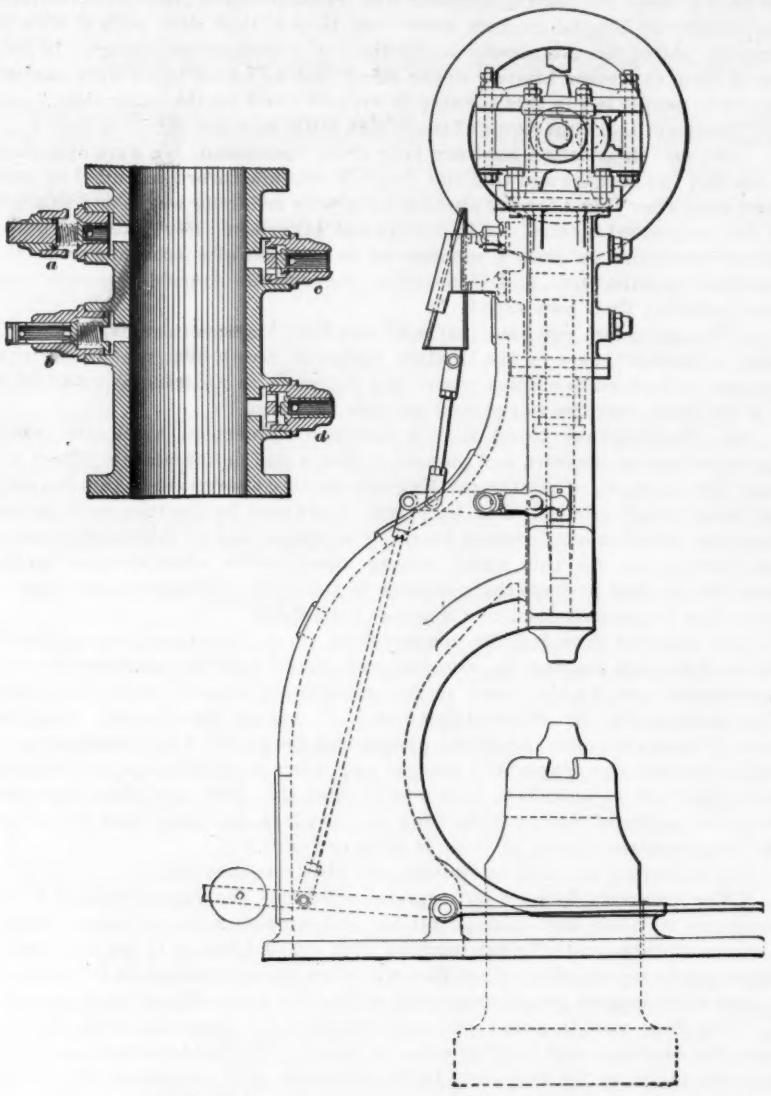
8th. It is more powerful, and yet more easily manipulated than any other hammer, either power or steam, and requires less repairs.

These hammers are built by the Hackney Hammer Co., Cleveland, O.

Relics of Early Ironmaking.

The first blast furnace erected in the present State of Maryland was commenced in 1723, by a company of English gentlemen. It was located in Cecil county, near the mouth of Principio creek, about six miles distant from the town of North East, and it was probably completed and put in blast in 1724, over one hundred and sixty-six years ago. A forge was connected with the furnace. Both the furnace and forge were successfully operated for many years. More than twenty years ago, while several men were engaged in grappling for iron ore in the Patapsco river, off Fort Henry, they found about 15 tons of pig iron in an advanced state of oxidation. Upon examining the pigs it was found that some of them contained the words, "Principio * 1751," in raised letters on their surface. Two of the pigs marked in this manner were secured by the Stickney Iron Co., of Baltimore, who presented one of them to

the Maryland Historical Society, and the other is now in our office. One of our young friends connected with the Lukens Iron & Steel Co., of Coatesville, Pa., has made us a most beautiful present, in the name of his company. It is a steel engraving, handsomely framed and inscribed, representing



SECTIONAL VIEW 200-lb. HACKNEY HAMMER.

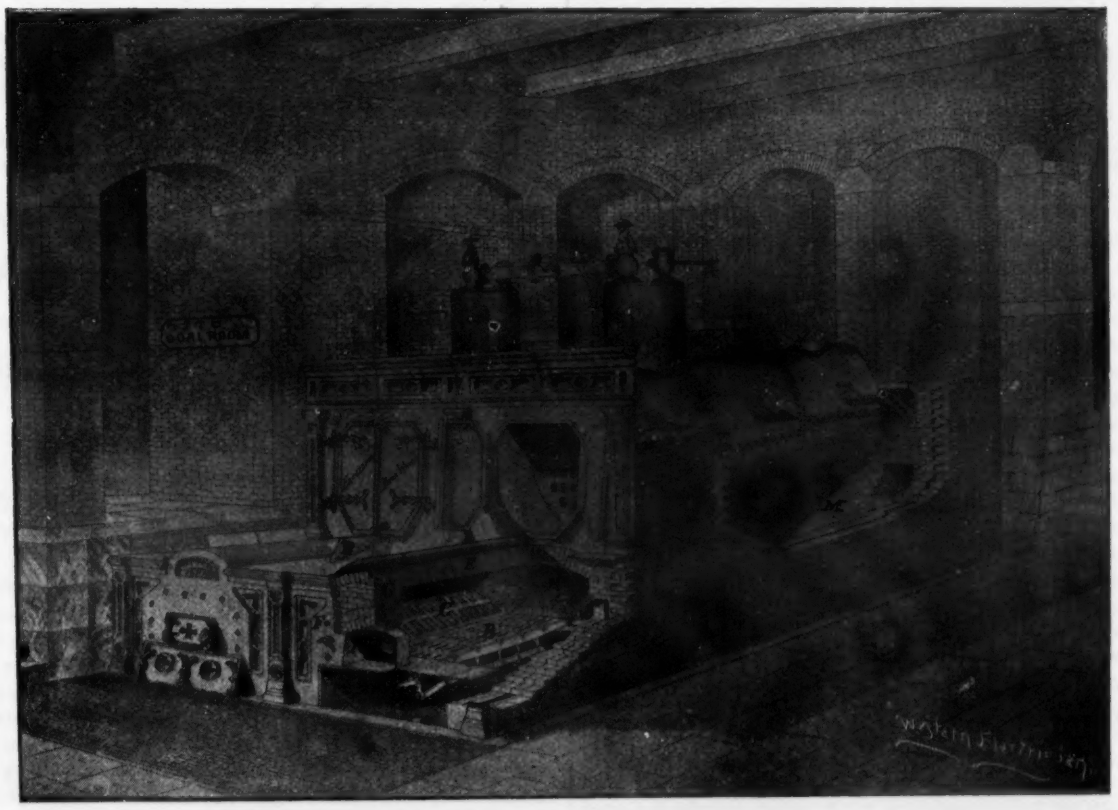
the interior of the old Lukens rolling mill, at Coatesville, which was established in 1810. In that year Isaac Pennock built Brandywine rolling mill at Coatesville, which was purchased from him about 1816 by Dr. Charles Lukens. The first boiler plates made in the United States were rolled at this mill by Dr. Lukens. Upon his death, in 1825, the management of the Brandywine mill devolved upon his wife, Rebecca W. Lukens, by whom the business was greatly extended and profitably conducted for twenty years. After her death the name of the works was changed to Lukens Rolling Mill.—[Bulletin.

THE RITTER SELF-FEEDING SMOKELESS FURNACE.

In these days of close study of economies, the furnace herewith illustrated will enlist the careful examination of progressive manufacturers. The principle of the furnace in question is this: By a natural circulation, due to the temperature of the furnace, the proper amount of air is combined with the products of combustion, forming a gas, which is ignited by coming in contact with the arch heated to a very high temperature, the ignited gases passing under the boiler. The coke falling by gravity on the center grates is afterward utilized for effective work. Owing to the fact that this furnace projects out in front of the boiler, and that the coal is fed through the top pockets, any change of temperature on the sheets of the boiler is avoided, which changes have been found to have a very damaging effect where the ordinary setting is used. With the ordinary setting every time the door is opened for the purpose of replenishing the fire, the rush of cold air passing through acts directly on the sheets of the boiler, causing a very sudden contraction; when the door is again closed the heat acts on the sheets expanding them as suddenly. This action of expansion and contraction takes place every time the door is opened (about every 15 minutes), which has proven very damaging and expensive in a number of cases on account of leaking seams and strained rivets.

By referring to the illustration it will readily be seen how this furnace is applied to a horizontal tubular boiler, though it can be applied to any other style of boiler with as good results as to this. It will be noticed that the furnace projects out in front of the boiler about five feet. In operating, the coal is fed through the pockets D on top of the furnace, through the brick arch E, falling by its own gravity on the inclined grate C, and gradually working as required on the center shaking grate B. The principle is as follows: The coal is fed through the pocket D, and the escaping gases are mixed with heated air (from the masonry) supplied through tubes HH. As they combine and come in contact with the brick arch E, (which is heated to a temperature of from 2,500 to 3,000°) they are ignited and pass through the combustion chamber J, directly under the boiler, in a clear flame, which is entirely free from smoke. The door N in front is used for cleaning purposes only. The radical plate L is placed over the arch E, being a protection for the same as well as a guide to the feed pockets. The heated air from the arch E, which would otherwise be radiated into the fire-room, is carried back by a natural circulation due to the intense heat of the furnace, through a small flue at the rear end of the arch. The heated air from the masonry and iron work in front of the furnace which would otherwise be radiated into the fire-room, is carried back into the furnace through tube G. It can thus be readily seen that the user not only gets the benefit from all the gases contained in the coal, and also the coke which is on the center grates, but he also gets the benefit for combustion from the heated air contained in the masonry and iron work of the furnace. There is no necessity for the use of a forced draft or mechanical device owing to the natural circulation of the air and gases. N represents the fire-bed, which is built about 20 inches from the boiler and carried from the combustion chamber J to the rear end of the boiler, and forms a flue through which the gases have a clear sweep. Manufactured by Ritter & Burke, 90 La Salle St., Chicago, Ill.

IT is next to certain that the World's Fair will be open evenings, in all of its departments. The Directory has called for plans and estimates for lighting, by electricity, all of the buildings. It is proposed to light both the buildings and grounds so brilliantly that everything can be seen by night as well as by day, and it is expected that the scene at night will be one of marvelous brilliancy.



THE RITTER SELF-FEEDING SMOKELESS FURNACE.

ARTESIAN WELL PUMPS, BRASS WORKING BARRELS, ETC.

In the past few years many improvements have been made in methods of securing an abundant supply of pure water for domestic purposes, and for use in factories, etc. The drilled well, or as it is usually called, the artesian well, is in much favor among manufacturers, owners of business buildings, hotels, etc. Coming from lower strata of rock, the water from the drilled wells is much more pure than when obtained from the ordinary dug well or driven well. The Deming Co., of Salem, O., are making a line of pumping apparatus for non-flowing artesian wells; such as working heads for power, vertical steam pumping engines and brass working barrels.

The annexed cuts represent some of these articles. Fig. 435 is a working head for power, being made in different sizes with 10, 16, 24 and 30-inch stroke. Fig. 438 is a vertical steam pumping engine made in nine different sizes with 24, 30 and 36-inch stroke, adapted for artesian well cylinders up to 6¾-inch internal diameter, and for wells over 1,000 feet in depth. Fig. 324 is an artesian well cylinder or working barrel made entirely of brass, with cupped

FIG. 435.

FIG. 438.

FIG. 324.

leather plunger packings and bronze, or hard brass ball valves. These cylinders are made in sizes from 1¾ to 6¾ inches internal diameter and for stroke varying from 16 to 42 inches. The Fig. 324 artesian well cylinders are sometimes used in wells 2,000 feet deep. In using these cylinders with Figs. 435 and 438 pumping heads, the plunger and lower valve with pumping rod may be taken out for repairs, the inside diameter of the cylinder being one pipe smaller size than inside diameter of the conducting pipe. The pumping rod best adapted for these working heads and cylinders is made of ash wood, the sections being connected by wrought iron joints with box and pin coupling.

To those interested in the subject of independent water supply, the Deming Co. will be pleased to furnish catalogues and circulars, giving complete description and price list of pumps and well supplies of their manufacture, which embraces a great variety of pumps and auxiliary goods, such as iron and brass cylinders, well supplies, etc.

THE OUTLOOK FOR TINPLATE.

A press dispatch from St. Louis, July 4, says: The startling reports from the tinplate manufactories of Wales led a reporter to interview ex-Congressman F. G. Niedringhaus to-day. He was found in the midst of his tinplate samples, and talked willingly.

"The McKinley tariff bill," said he, "which made the production of tinned iron plate a possibility in the United States, went into effect recently, but the English operators would be astounded to know what preparations have been made in this country to reap the harvest that is ours by right. There are to my knowledge 22 firms now getting ready in the United States to make tin and terne, or roofing plates. The St. Louis Stamping Co. was, perhaps, better prepared to enter the business than any other company in the country, from the fact that they already have complete rolling mills where they produce the iron from the pig up to the finished sheet. These mills being arranged for fine sheet the company began to turn out tinplates as early as November, 1890, sufficient to keep one set of tinning pots running."

"What does 'a set of tinning pots' do?"

"It will turn out 40 boxes of 112 sheets each, each sheet 14x20 inches in diameter, and the weight of each box is 180 pounds. The new works now nearing completion in North St. Louis, will be the first of the kind ever built and the first in operation on a large scale in the United States. We expect to start up by August 1, and our output from the opening day will not be less than 600 boxes daily, tinplate and leadplate, known as roofing tin."

Mr. Niedringhaus here got up and gave the reporter one of his object lessons by contrasting the English roofing plate with that of the St. Louis make. To the most casual and non-technical eye the latter was as superior to its English cousin as a banana is to a paw-paw. Mr. Niedringhaus rattled a sheet of his own tinplate as if in defiance of the British tinplate lion, and, resuming his seat, toyed with an American block of tin paper-weight and spat into an American tinplated cuspidor and said:

"That English dispatch, I notice, says that the Welsh manufacturers have an immense capital invested, and that they intend to make every effort in their power to command the trade, and that they will do this by reducing the wages of the men, cheapening the cost of the raw material, lowering the payments for freightage and curtailing their profits in order to be able to pay the extra duty demanded by the new American tariff, which went into effect on Wednesday.

"Now, I do not doubt this at all. There will be quite a struggle for the trade between the English and American manufacturers. This would, perhaps, not have occured but for the apparent free trade victory in last Fall's elections, as a number of English makers were over here at that time with a view of locating. After the Congressional elections of 1890 they took heart. In fact, one of them expressed himself to the effect that he hoped there were enough free trade people left in this country to support them on the other side."

"Does not this shut-down of the Welsh mills surprise you?"

"Oh, no; their action has been long since discounted. We were appraised of the fact two months ago that the English manufacturers intended to shut down soon after July 1 for the purpose of largely reducing wages and salaries. As they expressed themselves, in letters and otherwise, they intended doing this to economize in such a manner as to successfully compete with the American manufacturer, and, if possible, prevent the American people from manufacturing their own supply."

"The cablegram you have just read says that American agents, professing to act by authority, are in the tinplate region of South Wales, claiming that they are authorized to employ 30,000 men for work in America at an advance of 50 per cent. over the wages they are now receiving."

Mr. Niedringhaus toyed with a handsome American block tin watch charm for several minutes and then said, slowly and deliberately: There is a great deal of room, of course, for English tinplate operatives in this country, and there is no doubt but that they will come over by the thousands to find more remunerative employment here. The wages paid in this country are at least double, and for thin sheet rolling about treble, what are paid on the other side, so that perhaps their scheme of reducing and oppressing labor to worse than its present condition may not avail them."

The reporter then led the conversation up to the possible or probable profits of tinplate making in America, and asked directly whether the consumer would not be the loser if the experiment should prove disastrous. With promptness Mr. Niedringhaus said: "It is no experiment. As to the price of the plate to the American people and the profit to the manufacturer, I will state that the people will not pay any more on an average for tinplates during the next 12 years than in the past. For the finer qualities, especially the extra quality of roofing plate, they will pay less, and then leave the American manufacturer a profit of from 10 to 20 per cent."

In concluding the chat on tinplate, Mr. Niedringhaus said:

"The American demand for tinplates will incur the expenditure of about $20,000,000 in labor and transportation, and employ 20,000 or 25,000 people. As our mountains and hills are teeming with ore and fuel, it is for the American people to say whether or not they will allow these treasures to lie dormant or raise them to give employment and add to the prosperity of their people."

"The duty now imposed on tinplates does not cover the difference between the American and English scale of wages, but the American manufacturers will make up the deficiency in the nearness and abundance of ore and coal."

New Style of Balance Sheet.

The Boston *Transcript* publishes what it designates the Wall St. balance sheet. It is a novelty in its way.

CREDITOR.

Great crops at home.
Small crops abroad.
Gradual recovery in the foreign financial situation.
Money market easy in the face of heavy gold shipments.
Probable cessation of gold shipments and return flow of the metal from abroad.
Generally sound conditions of the country's business.
Good railway earnings and bright prospects for continuation and improvement thereof.
Prices of securities low, offering many good bargains.

DEBTOR.

Lasting effects of last Fall's panic, enhanced by this year's heavy gold shipments.
Prospective heavy drain of funds against movement of the crops, and fears of unsettlement in the money market.
Free coinage of silver agitation and other financial uncertainties.
Timidity of capital.
Railway rate infelicities.
Uncertainties of the foreign financial situation.
Light volume of general business.
Public disgust and determination to keep out of the market.
Gentle reader be it your privilege to strike the balance.

The English Pig Iron Gamble.

A correspondent of the *Economist* writes: Speculative purchasers may delude a nervous buyer into undertakings exceeding his usual requirements, but any apparent improvement stimulated by a false demand can ultimately only cause disappointment and chagrin, resulting in consequent reaction. The late and present inflated state of the Scotch pig iron market is an example of the foregoing. It has not done, neither does it do, real good to the regular iron trade, nor does it remove at all the prevailing depression. When our customers for iron in foreign countries are once made cognizant of the fact of the unrealty of their hitherto fairly sure standard of value, namely, the daily return of the price of Scotch pig iron, their confidence is not easily restored.

EMBRACE the opportunity offered by the Nickel Plate, Monday, July 13th. A daylight Pullman coach excursion to Niagara Falls. Rates as low as ever. Inquire of agents. City ticket offices 224 Bank street, 598 Pearl street anddepota

STEAM USERS Should Read this.
Increase the Capacity of your Boilers.
Scale is a Non conductor of Heat.

SAVE YOUR FUEL AND PROTECT YOUR BOILERS FROM SCALE AND GALVANIC ACTION OF WATERS. WATERS ANALYZED **FREE** AND THE COMPOUNDS MADE TO SUIT EACH WATER.

INTERNATIONAL BOILER SOLVENT.
(PURELY VEGETABLE.)

Dearborn Drug & Chemical Com'y,

Manufacturing and Analytical Chemists, W. H. EDGAR, Manager. Office, Room 29, Rialto Building; Works, 4246 Champlain Avenue;
Ohio Office, Canton, O. ROBERT H. CREVOISE Agent. **CHICAGO, ILL.**
WRITE FOR INFORMATION AND PRICES. BEWARE OF INFRINGEMENTS.

STEEL STRUCTURAL WORK IN CHICAGO.

Chicago is rapidly becoming a city of steel, from the enormous quantity of that material used in the great down-town buildings. This extensive use of rolled steel for the skeletons of massive sky scrapers, has not only revolutionized the style of building, but it has as well created a new industry, the toilers at which have been classed and organized as architectural iron workers, to whose present strike the dailies have often alluded. Where does all this steel come from? Does Chicago roll any of it? Is it more expensive than the ancient method of building, and what precautions are taken to make steel buildings absolutely safe? are questions that almost any Chicagoan is interested in.

The pioneer among Chicago builders in steel-ribbed structures, George A Fuller, of the George A. Fuller Co., in speaking of this class of work, said:

"This Chicago style of architecture, as the steel-skeletoned business blocks may be termed, is six years old. The Chicago Opera House was the first fireproof building in the city in which this radical departure in building rules was made. The floor beams were those first used of steel. The columns were of cast iron. Then followed the Rookery, Counselman, Gaff and Board of Trade buildings, all with steel beams and cast iron columns. But steel is gradually replacing cast iron for columns. The Rand-McNally building was the first in which steel was used exclusively. But the Monadnock, Pontiac, Caxton, Kearsage, Northern Hotel, Masonic and Temperance temples, and the Fair building are all steel structures. The steel used besides the beams and columns is found in the frames of bay windows, roof work, supports for roofs—in fact, everything that assists in holding the weight of the building. The foundations also are of steel.

"This steel comes from various points. Almost all the heavy steel rails used in foundations are made by the Illinois steel Co. here in Chicago. These are the regular rails in use on railways. Rails are made to weigh from 60 to 80 pounds to the yard in length. The 75-pound rails are the ones used in foundations. Those foundations are laid deep of tiers of rails crossed, and are extended always into the street or alley beyond the building line, the distance varying according to the height and weight of the building. To illustrate: Under the Fair building foundation rails reach out 12 feet under the street and 9 feet under the alley.

"Of the steel beams 90 per cent. comes from Pittsburgh, from the mills of Carnegie, Phipps & Co. and Jones & McLaughlin. A heavy trade in beams is also done with Pottsville, Pa., Trenton, N. J, and Phœnixville, Pa. Certain sizes of steel beams are made by the Illinois Steel Co. They have recently prepared to compete with Eastern manufacturers in new lines by adding a fitting and finishing department to their mills in North Chicago. This will enable them to cut beams, columns and rails, punch holes in them and fit them up. They will doubtless secure a heavy trade in lines which the company have not heretofore touched. I know they will, for here is an illustration of it: I just let the new Athletic Club Building, on Michigan Ave., to them, because they are in line to do the work. The steel columns will be furnished for that building by Witherow, of New Castle, Pa.

"As to the cost of this steel I can give you only general figures. Steel columns and beams are worth $75 a ton delivered in Chicago. The combination price of steel beams is $3 20 for 100 pounds, without any fittings, Chicago delivery. Small materials in steel for such as windows and roof work cost from three to five cents a pound. The price on steel varies but little, as the mills have an agreement and there are but trifling deviations.

"As to relative cost of a steel-ribbed building to-day and one of the best-styled structures, say, ten years ago, the modern one is the more expensive, for labor is costlier now than then. But you see what really gave birth to this steel style of construction was the fact that none of the down-town Chicagoans wanted to leave the center of the city. Land and space grew more valuable and taller buildings became a necessity. The principal advantage of steel ones and the new style of construction is that the building can be made higher with safety. This style is lighter and stronger than the old method, too.

"Steel is succeeding cast iron. This is largely due to the fact that there is no practicable way of testing cast iron, while there is of steel. None of the manufacturers have ever made a machine to test cast iron. This seems odd, so long as there is quite a rivalry between steel and iron; but it is true. Cast iron columns are cast hollow while lying horizontally. The metal which is poured in, by running round the core to the bottom first, may press the core upward, so that on cooling the upper side of the column may be thinner than the under side. Again, there may be air bubbles form between two currents of molten metal. What inspection is made to look for those two defects. One method to determine the thickness is to bore small holes through the column, but there is absolutely no way to discover those air bubbles. The only other test is to set the column on end and bring an enormous hydraulic pressure to bear on it. Cast iron columns are fastened together in the building by bolts screwed on, while steel columns are riveted together in the building with red hot rivets. This makes the structure more solid.

"The manner of testing steel is thorough. The steel used is Bessemer and is rolled under a tremendous pressure. Air bubbles stand no show. They are pressed out. The colums are not round. They are made in plate form and riveted. They can be seen on all sides so as to determine their thickness. The inspection is elaborate. We have a chief inspector with a force of men under him at all mills from which we purchase. He is a professional expert, and reports to us daily. The inspectors take a quantity of metal out of each 'blow' and test it as to the quality of the steel it will make. If it is not up to the requirements we take no steel made from that 'blow.' It is inspected and tested again when the steel is made, and again while it is being put together, and if found defective at any point it is not used. Again, every piece of structural steel is numbered; not only that, but the ore is designated that shall go into a certain piece of steel. So thorough is this followed in detail and recorded that a builder, by referring to his office record, can trace back the course of any piece of steel in a building through the three stages of inspection, back to its original ore shape. In case of an accident he could thus locate the responsibility.

"So much for testing the quality of the steel. Now as to the load to be placed on it. One of those inspections I alluded to tests the breaking power of the steel, and we never load a building above one-fifth of that breaking power. In calculating so as to insure safety, we figure first on the straight downward pressure, then on the resistance of the wind. Besides this, on the tops of all these big office buildings are great water tanks to furnish water to run elevators and for the bowls, as the city water pressure does not drive water to the top of sky scrapers. Those full tanks are of tremendous weight. There must be extra support for their weight. Then the strain on an elevator is enormous at times. If filled with people, it is going down rapidly, and suddenly stops, the columns supporting that elevator must be extra strong or something will break. There are dozens of things that must be allowed for. It's a trade, a profession by itself, and there's plenty of room for thinking in it. Every precaution is taken to guard against accident, and to assure safety; that is to say, among those architects and builders of the city who have devoted great time to this class of structures, and whose names are identified in the public mind with this Chicago style of architecture."

General Superintendent F. H. Treat, of the North Chicago Rolling Mills of the Illinois Steel Co., said: "This company began rolling beams in 1888. Carnegie went into the business of steel beams in 1887. It's only recently that this company began preparing to go into the structural steel business extensively. They have now contracts for many large buildings, among others the upper portion of the Masonic Temple. Our fitting shop is just going into operation. We are preparing to make steel columns. We make up to 15-inch, but Carnegie makes a 24-inch beam, which is the largest made in the United States."—[Chicago Tribune.

Lake Chautauqua, the Queen of Summer Resorts.

At a lake of cool crystal water, located among the beautiful highlands of the Empire State, 150,000 people seek each Summer season the delightful rest always found in that wholesome atmosphere. Chautauqua: the famous resort! located between 1,400 and 1,500 feet above the ocean, whose facilities for boating, fishing and bathing are unsurpassed, and combine these pastimes with the advantages made possible through the educational and religous organizations, which make Chautauqua Lake their Summer headquarters, is it suprising that each season, thousands frequent its shores?

With hotel accommodations capable of delighting the tastes of the most fastidious, and boarding houses where families may secure commodious rooms and excellent service at reasonable rates, should it be wondered at that people flock from the smoke, dust and heat of our cities to enjoy the pleasures and benefits obtainable on the shores of this lake of springs.

Tourists selecting the Nickel Plate route to this queen of Summer resorts will find accommodations desirable in every appointment. Excellent connection is made for Chautauqua Lake, at Brocton Junction, N. Y., and from Mayville, N. Y., any point on the lake may be reached via boat or rail. Passengers holding tickets via the Nickel Plate to Niagara Falls, may secure stop-over at Chautauqua free of charge.

Be sure your tickets read via the Nickel Plate.

Wonderful Sights. Extremely Low Rates.

Niagara Falls is the world's most amazing sight, and the Nickel Plate excursion of July 13th enables every one to go at a small expense. Remember a daylight ride in Pullman day coaches. City ticket offices 224 Bank street, 598 Pearl street and depots.

CENTRAL THOMSON-HOUSTON COMPANY,

48 ARCADE, CLEVELAND, O.

S. D. NESMITH, - - - - - Manager.

Motors from 1-12 h. p. to 100 h. p.

ELECTRIC LIGHT PLANTS INSTALLED,

Arc and Incandescent, Direct and Alternating,

ELECTRIC FANS!

FANS FOR VENTILATING!

ELECTRIC SUPPLIES.

FUEL GAS AT FIFTEEN CENTS A THOUSAND FEET.

"What do you say to gas at 15 cents per 1,000 feet? Doesn't that beat your gas-trust prices? Well, that is just the figure at which a gas company has contracted to furnish gas in Waukegan. It is gas of 18 candle-power, too, and the concern that has agreed to make it thinks it has secured a mighty good thing."

The speaker was James Winters, at the Tremont, a natural gas expert from Pittsburgh, whose visit to Chicago was to investigate a new process of gas manufacture. He came here at the instance of Pittsburgh manufacturers. He will report favorably, and they will build plants for private use.

In the course of his investigation into the new process he met Prof. R. H. Smith, for nine years Gas Inspector of the State of Pennsylvania. Prof. Smith has been in Chicago for a month, and shortly after his arrival closed a contract with the gas company to furnish him gas in unlimited quantities at 15 cents per 1,000 feet at Waukegan. Prof. Smith controls the gas franchise at Waukegan, and last week returned to Pittsburgh to make the final arrangements to put in the new gas machines at Waukegan.

"Prof. Smith, I think, has made the greatest bargain he ever struck," said Mr. Winters yesterday. "Smith told me he had been looking around for years for a cheaper process for making gas, when he was referred to a chemist named Thurston Z. Hall, who, I believe, lives in Milwaukee. Hall claimed to have a machine that would make gas from garbage if there were nothing else to make it from. One evening Hall dragged Smith out to a place at the end of the Clybourne avenue car line near the Deering Harvester Works, which will be supplied by this plant. I have been out to see it, too, and the thing can be heard making gas two blocks away, and out of two, four and six inch pipes the gas blows just as I have seen it in the natural gas fields of Pennsylvania. The gas was lighted and illuminated the prairie for squares around. Prof. Smith made a thorough investigation of the method of manufacture and then closed a contract with Hall. He told me the machine would be on the ground in three months, and that Waukegan would soon be supplied with the cheapest artificial gas in the world. When I saw the machine last evening it was shooting off gas at the rate of 1,500 cubic feet a minute and making a noise like a threshing machine. The machine is a squarely-built furnace made of firebrick and iron. At the top is an iron door, into which the coal is thrown. On the coal is dropped a 500-pound weight, crushing the coal down to a solid mass. Running into the coal from the bottom is a pipe which blows air at a heavy pressure. This creates an enormous draft and is what makes the roaring sound. The draft forces a fire through the coal, making an intense heat, and the gases from it are forced into a receptacle containing electrodes. Here occurs a chemical process, and after this the gas goes into the pipe pure and clean. Hall has demonstrated to me that his machine makes gas for next to nothing. While I was out there he made 500,000 feet of 18 candle-power gas out of one-half ton of coal, and smoke and everything was consumed. All that was left was about 20 pounds of stone and iron from the coal."—[Chicago Tribune, 27th.

Steel Rail Mills for Australia.

Some weeks ago we published the fact that New South Wales has called for 175,000 tons of rails manufactured in the colony "out of iron ore and other necessary minerals, the natural products of, and with coal, coke or other fuel smelted, gotten and raised within the colony;" the deliveries to extend over a period of five years from Jan. 1, 1893, at a price equal to the ruling price for the time being for British-made rails landed at Sydney. The *Colliery Guardian* says that a syndicate of Scotch iron masters and a member of the New South Wales Legislature are examining the probable profits of the operation, and have found that the iron ore analyzes from 55.77 to 56.70 per cent of iron; 0.044 to 0.048 per cent. of phosphorus, and 5.02 per cent. of silica; and hope for a profit of £2 per ton. Besides the contract for New South Wales they hope to supply the other Australian colonies and New Zealand.

The Hardware Trade.

Reports vary considerably as to the hardware business of June. On the whole there has been a fair volume of trade at comparatively steady prices, though too low for satisfactory profit. Shelf and heavy hardware have been in good demand; so have wire nails at low prices, and barb wire has gone off well for the season. There is little further to say except that from every quarter come expressions of confidence in the future.

A NEW process for desulphurizing pig iron has been perfected by an inventor at Hœrde, Germany. Its practical operation is fast winning it a reputation, and already a number of the extensive works have applied for a right to use it.

PRACTICALLY DEMONSTRATED.

THE HACKNEY POWER HAMMER

is meeting with DESERVED SUCCESS, and an investigation as to its principle of operation and construction will convince anyone beyond question of its superiority in every respect over the old-fashioned-helve rubber cushioned-leather strap-awkward belt tightener power hammers sold to-day. All such old fogy and frail appliances are done away with in the "HACKNEY," and the purchaser gets for his money a vastly more EFFECTIVE and DURABLE HAMMER.

That the "HACKNEY" is far ahead of any other power hammer in the market is PRACTICALLY DEMONSTRATED, and we have strong testimonial letters from leading firms throughout the country who have used them.

Write for Illustrated Catalogue with Description and Prices.

THE HACKNEY HAMMER CO., Cleveland, Ohio.

INDUSTRIAL SUMMARY.

New Enterprises:—

The Ohio Wheel & Foundry Co. has been incorporated at Toledo, O., where operations will be carried on.

The Maist & Gorten Machinery Manufacturing Co. have been incorporated at Warsaw, Ind., with a capital of $25,000.

The Graham Wrench & Drop Forging Co., of Buffalo, N. Y., has been incorporated to manufacture a new pipe wrench; capital $40,000.

A movement is on foot at Scranton, Pa., to build a wire-drawing plant and nail factory. James Nolan is mentioned as the orginator of the enterprise.

The Globe File & Hardware Co. has been incorporated at St. Louis, Mo., with a capital of $20,000. Stockholders, C. H. Niekamp, C. J. Becker and A. O. Rule.

The Wallace & Graves Machine & Foundry Co. has filed articles of incorporation, at Lafayette, Ind. The capital stock of the company is $20,000, and it will manufacture steam boilers and castings.

The stock company recently organized by W. A. Rinehart and others, to erect an iron foundry and machine shop at Covington, Va., has been incorporated at the Covington Machine Co., with a capital stock of 500,000.

The well-known firm of Fairbanks, Morse & Co., manufacturers of scales and machinery at Chicago, have been incorporated under the same name with a capital stock of $1,000,000 The incorporators are Charles H. Morse, C. A. Sharpe and W. E. Miller.

Gen. J. T. Wilder and others, of Johnson City, are negotiating with J. E. Keller, of Louisville; B. R. Hutchcraft, of Lexington, Ky.; H. H. Talmage, of Washington, D. C., and others with a view of securing the building of large steel works, at Johnson City, Tenn.

The Saline (Ark.) Iron Works has been organized with J. W. Martin, President; J. R. S. Meek, Vice-President and J. M. Baily, Secretary, with a capital stock of not more than $25,000. This company is reported as having purchased the Warren Iron Works, and is to enlarge and operate same.

The proposition of Dr. Charles J. Eames, of Pittsburgh, to build an iron and steel plant on San Diego Bay, near San Diego, Cal., of 100 tons daily capacity, for a subsidy of $200,000 in cash and land, has been accepted by the Chamber of Commerce of that city, and a committee appointed to perfect the plans.

The East Lebanon Iron Co. have been formed at East Lebanon, Pa., to erect a rolling mill at that place. The capital of the company is $100,000. N. E. Legat is President, and the remainder of the directory is composed of H. O. Nully, James E. Legat, J. R. Beckley, Daniel S. Light, J. B. Irish and H. T. Atkins.

The Hill Machine Co. has been reorganized at Florence, Mass., with a capital of $100,000, and these officers: President, A. G. Hill; Vice-President, Max Ulrich; Treasurer and Manager, C. H. Clute. It is proposed to erect new shops at once for the manufacture of the Ulrich steam engine, and plans are now being drawn.

The United States Iron & Tinplate Co., of Demmler, Pa., has been granted a charter, with a capital stock of $500,000. The directors of the new company are: Henry H. Demmler, Louis F. Demmler, of Pittsburgh, Pa.; Albert J. Demmler, of McKeesport, Pa.; Edward Ely, of Philadelphia, and Wm. C. Cronemeyer, of Versailles Township, Allegheny County, Pa.

The new safe and lock works which are to be erected at Elizabeth, N. J., have been duly organized, with a capital stock of $200,000. They elected J. R. Wylie, as Treasurer, and C. H. Underwood, E. W. Neff, J. T. Hough, J. B. Sheriff, Jas. H. Graham, W. C. Voigt and John Collier as directors. The company will be known as the American Vault, Safe & Lock Co.

A company has been organized in Pittsburgh for the manufacture of razors, surgical instruments and high grade edge tools generally. The incorporators are A. H. Church, R. D. Nuttle, John T. Wheeler, J. G. Ihmsen and H. Watts, and the concern will be known as the Sterling Razor Co. They say they can get steel in Pittsburgh good enough for any purpose to which it is at present put.

The Kingsley Foundry Co., of Lorain, O., have commenced building operations upon their 20-acre purchase at Hammond, Ind. Five structures will be put up at a cost of $100,000, work on the foundations of the main building, to be 200x85 feet, being now in progress. Besides this building there will be a boiler, engine, pattern-making room and office buildings. All the buildings will be of brick.

Among recently authorized corporations in Illinois are the following: The Patton Adjustable Store Shelving Co., at Chicago, capital stock, $100,000; for the manufacture of store fixtures; incorporators, J. W. Patton, Jacob Hendershott and G. W. Cole.—The Karl Check Hook & Novelty Co., at Chicago, capital stock, $100,000; for the manufacture of novelties; incorporators, G. W.

Cole, K. G. Bareis and J. E. Harder.—The Rockford Flour Sieve Co., at Rockford, capital stock, $25,000; for the manufacture of flour sieves; incorporators, John Thelberg, H. Wallerstedt and R. G. McEvoy.—Railway Supply Foundry Co., at Chicago, capital stock, $60,000; for general manufacturing; incorporators, Irwin Veeder, W. M. Reem, and O. R. Barnett.

Additions, Enlargements, Removals, etc.:—

The plant of the Donaldson Iron Co., at Emans, Pa., is to be increased.

M. Osborne is to add new machinery to his mill at Bloomingdale, Wis.

The Hendrick Manufacturing Co., of Carbondale, Pa., has broken ground for a new machine shop 140x40 feet.

At Clarksburg, W. Va., A. H. Osburn will rebuild at once his foundry and machine shops recently destroyed by fire.

The Pitman Manufacturing Co., of Laconia, N. H., will soon begin the erection of new buildings at a cost of $20,000.

Combs & Brown, machinists, at Woburn, Mass., are building at Haverhill, and expect to move their business there in July.

The Sands Automatic Fan Co. has filed in the Secretary of State's office a certificate of removal from Meriden to Bridgeport, Conn.

The Farrell Foundry & Machine Co., Waterbury, Conn., will begin work soon on a new machine shop, 100x100 feet, one and two stories in height.

A new building, to be equipped with machinery, is to be added to the plant of J. M. Robins & Co, manufacturers of special metal-working machinery at Cincinnati, O.

The Mason-Perkins Manufacturing Co., Bristol, N. H., has commenced work on the foundation for an extension to its machine room, and will shut down about July 1 to complete the work.

The Lansberg Brake Co., of St. Louis, Mo., will add an additional story to its shop, and put in $15,000 worth of new machinery. The company is now turning out orakes at the rate of 150 a month.

The Valley Iron Works, of Williamsport, Pa., is about to remove its entire plant to Lynchburg, Va., where it is erecting extensive works. Hereafter it will be known as the Valley Engine & Machine Co.

Messrs. I. Matheson & Co., New Glasgow, N. S., are building a 150x75 feet addition to their works, to be used in the construction of steam boilers. This concern is a large manufacturer of mining machinery.

The G. A. Gray Co., Cincinnati, lathe manufacturers, have purchased the Thomas property, on the northwest corner of Harrison avenue and Brighton street, being about 150x300. The consideration was $36,000. They will erect a large brick building on the lot, to cost not less than $25 000.

The capital stock of the Ticonderoga Machine Co., Ticonderoga, N. Y., has been increased from $30 000 to $125,000, and an addition is being built to the old machine shop, which will be 144x80 feet. The building will be of brick, and equipped with the most modern machinery for the manufacture of mining machinery and gas engines.

Fires and Accidents:—

Morgan's Iron Works in New London Conn., were burned on the 25th ult. Loss, $75,000.

The Elmira Rolling Mill Co., of Elmira, N. Y., was damaged by fire recently. The loss will amount to $10,000.

The finishing department of the Alabama Rolling Mills at Gate City, near Birmingham, was burned 25th ult. The loss is estimated at $20,000.

The old Ferry Rolling Mill of the Diamond State Iron Co., in Wilmington, Del., was destroyed by fire on the 27th ult. The loss is estimated at $500,000.

A fire at the Missouri Car & Foundry Co.'s Works, St. Louis, destroyed the blacksmith and machine shops, entailing a loss of about $15,000. The shops will be immediately rebuilt, and the machinery destroyed, duplicated as quickly as possible.

General Industrial Notes:—

The foundry department of the Pennsylvania Steel Co.'s Works, at Steelton, Pa., about two weeks ago cast a bed plate for the universal mill which weighed over 25 tons.

J. H. Day & Co., corner Broadway and Eggleston avenues, Cincinnati, O., have made a sale of an outfit of sifting and mixing machinery, to a firm in Nottingham, England. Messrs. Day & Co.. report thus far this season a good trade in all the various kinds of machinery made by them.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 28th day of July, 1891, for all the labor and materials required for the iron stairs, iron work, etc., of elevator shaft, for the United States Court House, Post Office, etc., building at Denver, Colo.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 18th day of July, 1891, for all the labor and materials required to furnish and put in place complete, the low temperature, hot water, heating and ventilating apparatus, for the United States Post Office, Custom House, etc. building at Wilmington, N. C.

A new design for a heating furnace was put in operation at the Arethusa Iron Works at New Castle, Pa., recently. A blast is maintained by steam jets forcing the air through seben tuyers connected with flues that conduct the air to fire, being heated by passing under the furnace and fire-bed. It was thoroughly tested with good results. By this way a saving of time and fuel can be obtained.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburgh, Pa., are at present crowded with orders for sand, chill and semi-steel rolls. They have lately built a large addition to their foundry, an iron building 200x65 feet. They are putting in two very heavy cranes and will soon be in a position to make castings of any size up to 40 or 50 tons in one piece. They are also puting in an open-hearth steel furnace with hydraulic cranes, etc., and when the foundry is finished it will be one of the finest and best equipped in the country. They are also overhauling and rebuilding all their tools in the machine shop and adding new tools as fast as possible, so will soon also have one of the best equipped machine shops in the State.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 30th day of July, 1891, for all the labor and materials to fix in place complete the low pressure, steam heating and mechanical ventilating apparatus, and the concrete floor of basement for the United States Court House and Post Office Building, at Louisville, Ky.

People Who Have Been There

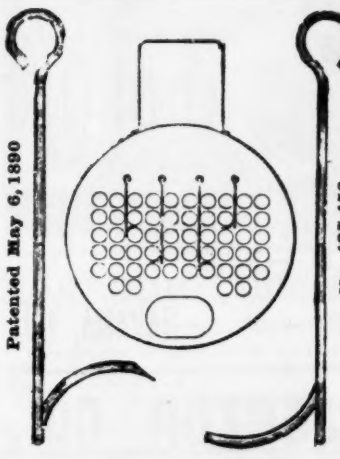
Always want to go again. Take the Nickel Plate daylight Niagara Falls Excursion, July 13th. Ask nearest Nickel Plate agent. City ticket offices 224 Bank street, 598 Pearl street and depots.

HAS YOUR WAREROOM BEEN ROBBED?

Our corrugated or plain Iron or Steel **SHUTTERS** and **DOORS** will render it Fire and Burglar Proof. We also cover wooden shutters and doors with flat painted sheets, either plain or with corduroy corrugations. For prices, etc, address

The Cincinnati Corrugating Company,

BOX 320. **PIQUA, O.**



TO USERS OF TUBULAR BOILERS

Why you should use Bauer's External Flue Scraper, as it is the only known device that removes the scale and sediment from the outside of the flues.

B 1st. Removes scale from the external surface of the flues.
E 2d. Saves flues from collapsing and overheating.
C 3d. Gives absolute protection to flues from scaling.
A 4th. By removing this scale from the flues and boiler head, saves flues, extra fuel and repairs.
U 5th It will save its price the first time it is used.
S 6th. A set should be in the hands every engineer.
E 7th. Price $10 a set of 5 pieces, are sent on 30 days' trial. Send outside diameter of flues.

Send for circular of both the Scraper and of our Sensible Automatic Packing.

Sensible Automatic Packing Co.,
63 South Canal St. CHICAGO ILL.

DIXON'S GRAPHITE PAINT

THOSE who use it say that one pound will cover 2 to 3 times more surface and last 4 to 5 times longer than any lead, mineral or metallic paint. A tin or iron roof well painted will not require repainting for 10 to 15 years.

JOS. DIXON CRUCIBLE CO.,
Jersey City, N. J.

Patent Milled or Turned Shafting

Is rapidly coming to the front.
Made only by

The Brightman Machine Co.

CENTER ST. FROM MAIN TO WINSLOW,
CLEVELAND, O.

INDUSTRY FILE WORKS,
A. & H. Gough, Props.,
Manufacturers of
Files and Rasps,
Equal to the Best English File.
OLD FILES RE-CUT.
All Kinds of Job Grinding.
OFFICE & WORKS,
48 COLUMBUS ST.,
CLEVELAND, O
C. GOUGH Manager.
Mention this paper.

L. H. OLDFIELD.
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WICHITA, KANSAS.

DESKS.

BANK, RAILROAD
—AND—
OFFICE + FURNITURE.
Interior Work a Specialty.
Send for Illustrated Catalogue.
THE CLEVELAND DESK CO.
97-99 Ontario St.. - . Cleveland, Ohio.

Plate Iron Washers
A SPECIALTY!
Even in Guage, smooth and well finished.

Cut from new plate, rolled expressly for the purpose. Write for prices, Address,
MILTON MFG. CO., Milton, Pa.

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ROBERT AITCHISON
PERFORATED METAL CO.
CHICAGO, ILL.

ESTABLISHED 1868

→PERFORATED METALS OF ALL KINDS

OFFICE 510---265 to 269 DEARBORN ST.
WORKS AT SOUTH CHICAGO.

"Quick-Laid" Steel Roofing.

Roofing and Packages Patented

EVERY ROLL COMPLETE.

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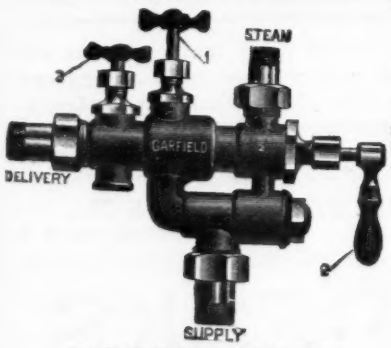
Find This
ROOFING
JUST WHAT
Their Trade Requires.

Does away with labor required by others; makes Roofing profitable; has no exposed Nails, Rivets or Cleats; is packed in Patent packages, which protect it in shipping. It pleases all who use it.

—MANUFACTURED BY—
HEBERLING METAL ROOFING CO., - - HAVANA, ILL.

THE GARFIELD INJECTOR CO.,
WADSWORTH, O.,
—MANUFACTURERS OF—



The Garfield Double Jet Injector.

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Locomotive Injector,
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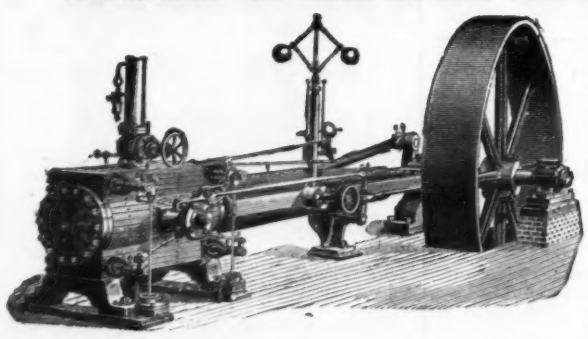

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FOR SALE.
1 $250 BOND - First-Class Security.
Bearing 8 per cent., payable semi-annually.
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MANUFACTURERS OF PERFORATED METALS FOR SUGAR HOUSES, DISTILLERIES, PHOSPHATES AND FERTILIZING WORKS.
COTTON SEED OIL MILLS. RICE MILLS.
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PERFORATED BRASS. PERFORATED TIN.
284 Pearl St. cor. Beekman, NEW YORK.

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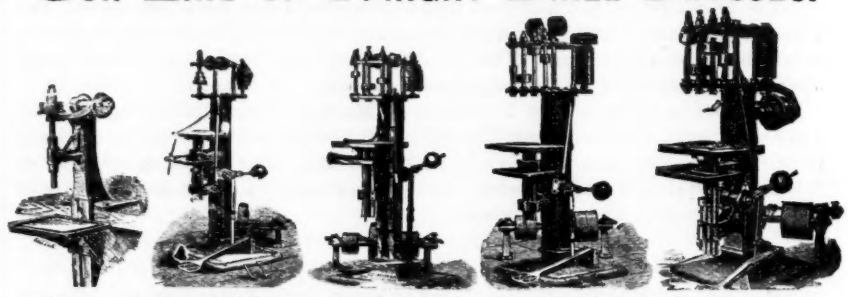
Light Bench or Post Drill. | No. 1 Drill Press. 1 or 2 Spindles. | No. 2 Drill Press. | No. 3 Drill Press. | No. 4 Drill Press.

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Manufacturers of, and Dealers in, all kinds of
Machinery and Machine Tools.
Universal and Plain Milling Machines, Drill Presses, Screw Machines, Hand and Engine Lathes, Planers, Profilers, Chucking Machines, Gear Cutters, Die and Cutter Grinders, Tapping Machines, Wire-Spring Coilers, Milling Cutters, etc.
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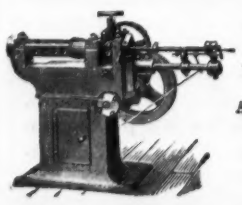

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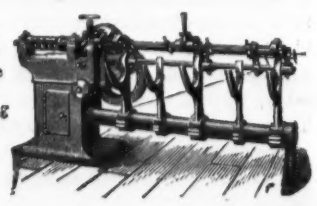
Builders of Machinery for Hardware Manufacture.
Automatic Wire Straightening and Cutting Machines, Butt Milling Machinery, Butt Drilling Machinery, Riveting Machines, Foot Presses, Sprue Cutters, Etc.



The Wock Patent Slip Joint Eaves Trough, 10 ft. 2 in. Long, Without a Seam.

Steel and Wire Hangers, Etc.

THE BELDING PATENT LOCK SLIP JOINT TROUGH, Manufactured by **THE CANTON STEEL ROOFING CO., Canton, O.**

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No.1.foundry,$16 25@17 00; Southern Coke No. 2 Foundry, $15 25@16 00; Southern Coke No. 3 Foundry, $15 00@15 75; Southern Coke No 1, Softeners, $15 25@16 00; Southern Coke No. 2, Softeners, $14 50@15 25; Ohio Silveries No. 1, $17 75@18 75; Ohio Silveries No. 2, $16 75@ 17 75; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 25@18 25; Lake Superior Charcoal Nos. 1 to 6, $17 75@18 50; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 00@18 00; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $12 75@13 25; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 50@20 50; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 00@00 00; Mahoning and Shenango Valley strong, No 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $17 00@00 00; Ohio Softener No. 2, $16 00@00 00; Jackson Co., Silvery No. 1, $18 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 00@00 00; Tennessee Charcoal, $18 00@19 00; Southern Softener No. 1, $16 25@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00' Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@20 00; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. 3, $14 00@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00.

DETROIT (reported by William F. Jarvis & Co): Lake Superior Charcoal, all Numbers, $18 00@18 50; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $00 00@00 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 25; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@14 50; Jackson County (Ohio) Silvery, $18 00@18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co): Southern Coke No. 1 Foundry $14 50@15 00; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey,$00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $19 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 00@16 50; No. 2 Foundry, $15 00@15 50; Grey Forge, $14 00@14 25; White and Motfled, $13 00@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $22 00@27 00; Bessemer, $16 50@16 75.

MERCHANT IRON AND STEEL.

Flat Bar

1¼ to 4 by ⅛ to 1 inch	1 80
4¼ to 6 by ⅛ to 1 inch	1 90
1¼ to 6 by 1¼ to 2 inch	2 20
1¼ & 1¾ by ⅛ to ¼ inch	1 90
1 & 1¼ by ⅛ to ¼ inch	2 00
⅝, ¾ and ⅞ by ⅛ to ½ inch	2 20

Round and Square.

1 to 1⅞ inch	1 80
2 to 3½ inch	2 00
3¼ to 3¾ inch	2 80
3½ to 4 inch	2 80
4¼ to 4¾ inch	3 30
4¾ to 5 inch	3 50

Oval.

⅜ to 1¼ inch	2 20
½ to ¾ inch	2 40
⅞	2 60
1	3 00

Half Oval and Half Round.

1⅜ to 3 inch	2 90
⅜ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅞	3 30
1	4 80

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	2 00
¼ to 1¾ by ¼ and 5-16 inch	2 10
¼ to ⅜ by ¼ and 5-16 inch	2 30
⅜ to 1 by ¼ and 5-16 inch	3 80

Hoops.

1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
1¼ to 2, No. 19	2 80
1¼ to 2, No. 20	2 90
1¼ to 2, No. 21	3 00
1¼ to 2, No. 22	3 10
15-16, 1 and 1¼, Nos. 13 to 15	2 80
15-16, 1 and 1¼, Nos. 16 to 18	2 90
15-16, 1 and 1¼, Nos. 19 and 20	3 00
15-16, 1 and 1¼, No. 21	3 10
15-16, 1 and 1¼, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 20
1¼ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅜ and 13-16 by ⅛ to 3-16 in	2 70
⅜ and1 3-16 by Nos. 11 and 12	2 80
⅜ and 11-16 by ⅛ to 3-16 in	3 00
⅜ and 11-16 by Nos. 11 and 12	3 10
½ and 9-16 by ⅛ to 3-16 in.	3 30
½ and 9-16 by Nos. 11 and 12	3 40
½ by ⅜ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
½ inch, " " " 11 and 12	3 10
½ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	½c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1½c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ½ in "	09
7-16 to ⅝ and 2¾ to 3 in	10½
3¼ to 4 in	11
⅝ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 75
Tire	"	2 75
Spring	"	3 25
Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, 5/32, 11-16 and ¼ inches diameter	4 00
Bridge ⅛, 5/32, 11-16 and ¼ inch diam	4 00

SCRAP IRON AND OLD METAL.

NET TONS	
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	12 00
Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	8 00
Uncut wrought iron boilers	11 00
Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanised and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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CAMBRIDGE REFINED IRON. TRADE MARK

Squared Roofing Sheets a Specialty

CAPACITY RANGES FROM No 30 26 INCHES WIDE TO 1-4×40×120

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Magnetic Concentration of Iron Ore.

Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

H. E. COLLINS & CO., Agents Magnetic Separator Co.,

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Successors to Tuttle, Oglebay & Co.,

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Iron - Ores,

FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

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J. H. OUTHWAITE. W. G. POLLOCK.

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Exclusive attention given to

LAKE SUPERIOR AND MENOMINEE RANGE

Iron Ore,

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THE CONDIT-FULLER CO.,

Pig and Bar Iron,

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Iron Ore, Pig Iron

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Cleveland Iron Mining Co.,

Dealers in Iron Ores

from their own mines near Marquette, Lake Superior.

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CLEVELAND O.

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MINERS AND SHIPPERS OF

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Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.

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Lake Shipping Point, Lorain O.

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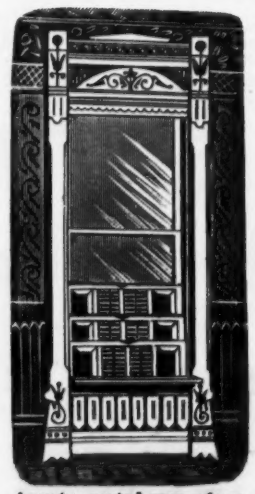
MAKERS OF

Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus st. Factories on Columbus, Winter and Leonard streets.

Cleveland, O., U. S. A.

Hartman's Patent Inside Sliding Window Blind



is the most popular Blind in America. Architects & builders prefer it to any other, for merit, style, convenience and economy.

Not Complicated.

The Only Blind that is furnis'd with an automatic Burglar-Proof Lock, free of charge. This is an item of immense magnitude, and may save you many times the cost of blinds & perhaps life also, and the only blind that gives entire satisfaction.

Thousands are in use.

Agents wanted everywhere. Send for illustrated catalogue and prices. Manufactured by

HARTMAN & DURSTINE, No. 59 Beaver St. Wooster, O.

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Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned.....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 65

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" " Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 30
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅜".....dis 50&10
Morse Taper and Straight shank Larger than 1⅜".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
¼ kegs ₩ lb	4½c	5½c		2¾c
½ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11⅜	8⅝	6	5⅜	5⅛	5
Washers	9	8	7	5	4⅛	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards,	Hand and Nut	to 2 in.		dis 50
Carpenters'	"	"	"	dis 50
Morse	"	"	"	dis 50
Pratt & Whitney	"	"	new list	dis 10
Machine Screw Taps				dis 55
Pipe Taps to 2¾ in.				dis 70
Stay Bolt Taps				dis 25
Stove Bolt Taps				dis 50
Pulley Taps				dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ lb Balls	21c@29c	
No. 18 " " ¼ and ⅜ "	18c@28c	
No. 36 " " ¼ and ⅜ "	16c@27c	
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine	11¼c	
3-Ply " 1lb Balls	12@12¼c	
3-Ply " 1¼ lb Balls	11@11¼c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

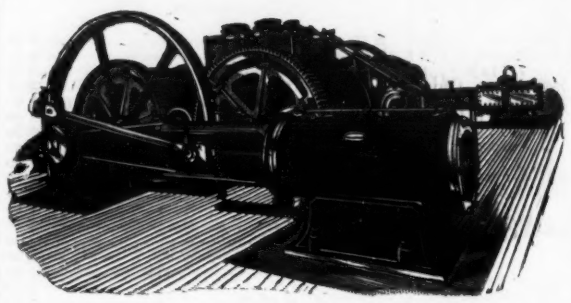
New List, Jan. 18, 1884.

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00 ₩ lb dis 5

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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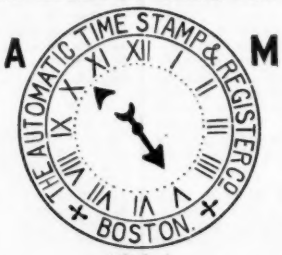

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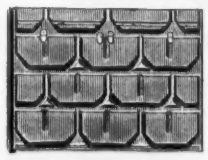

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" 3 " 1 to 3¼ " " 3 50
Price, per set of three, to take from ¼ to 3¼ in. 7 50

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Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $7 00
Others.....₩ doz $6 00
Full polished.....₩ doz $8 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

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No. 1—Slaters'.....	$1.25
"A," Stringed Roofing, Light.....	1.50
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Asphaltum, Trinidad Refined, ₩ ton.....	$30.00
Asphaltum, Fine Grade, ₩ lb.....	.08
Coal Tar Felt, 1 Ply, ₩ lb.....	.02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft.....	1.42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft.....	1.85
Roofing Pitch, ₩ gal.....	.09

Chains.

Revised List.

Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 } .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5½@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt.....	$4 00	$4 50	$.....
Dairy, 14 qt.....	4 50	5 00	.....
Fire 12 qt.....	5 00	.....	.....
Sugar.....	6 00	6 50	.....
Horse.....	.....	5 00	.....
Buggy.....	4 00	.....	.....
Chamber } 5 and Slop } 5X Commode } 14 qt.....	6 50	7 50	8 50
Mrs. slop, 5 and 5X 14 qt.....	8 00	9 00	10 00
Basins, wash—			
10½ inch.....	2 00	2 25	.....
12 inch.....	2 25	2 75	3 25
13½ inch.....	2 75	3 25	3 75
15 inch.....	3 25	3 75	4 25
Bowls, fruit.....	.....	2 50	.....
Servers, 12 in.....	.....	2 25	.....
Baskets, waste paper, 13 in.....	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch.....	4 00	4 50	5 00
10 and 11½ inch.....	6 00	6 50	7 50

No 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 55
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....3 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ₩ lb..	23	24	25	26	28	dis 40
Putnam, ₩ lb..	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

Steel and iron } dis 75&10@80
Nickel plated.....
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 4c&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 65&10
Basket nails.....dis 65&10
Chair nails.....dis 65&10
Common and patent brads.....dis 65&10

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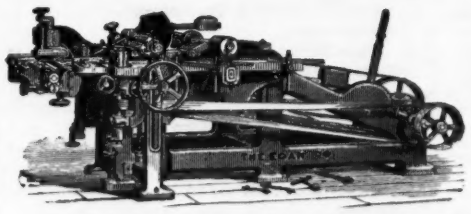
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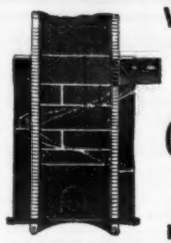

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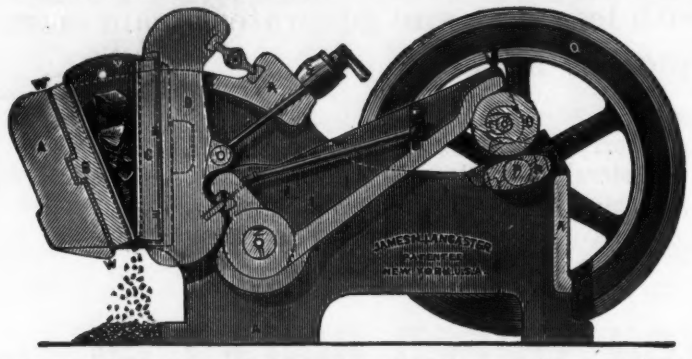

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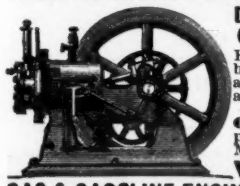

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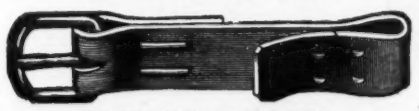

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Fast N. Y. & Pitts. Express*	10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

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	Depart.	Arrive.
Valley Junction Mail.....	*7 35 a m	*6 40 p m
Marietta Express.....	†11 15 a m	†2 35 p m
Balto. & Wash. Express....	*4 00 p m	*10 25 a m
Cleve. and Canton Express	†6 30 p m	†8 15 a m

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	Arrive.	Depart.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	d5 25 a m	7 45 a m
	d11 40 a m	d1 40 p m
	6 35 p m	d11 10 p m
Wellsville, Wheeling and Bellaire.	12 30 p m	7 45 a m
	6 35 p m	1 05 p m
	.....	*11 10 p m
Alliance Accom.....	10 10 a m	3 25 p m
Ravenna Accom.....	8 25 a m	5 00 p m

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Cleveland & Pittsburgh R. R.

	Arrive.	Depart.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	d 7 00 a m	8 00 a m
	5 40 p m	d 8 00 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	12 30 p m	1 05 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	5 40 p m	8 00 a m
	10 10 a m	3 25 p m

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No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 30 p m
No. 73, Leavittsburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No. 75, Mantua Accom.....	* 7 20 p m
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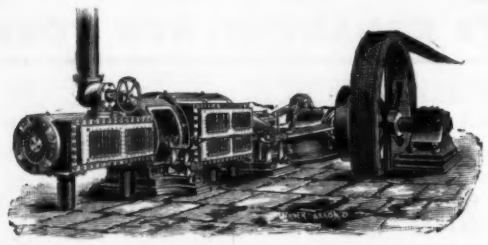

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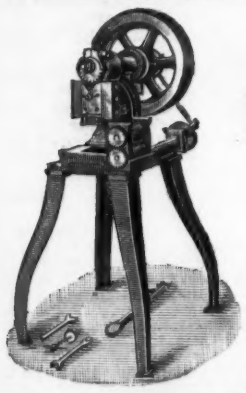

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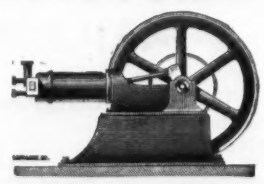

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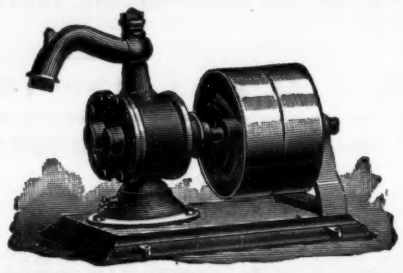

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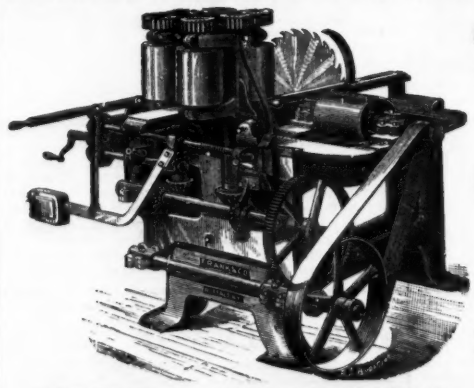

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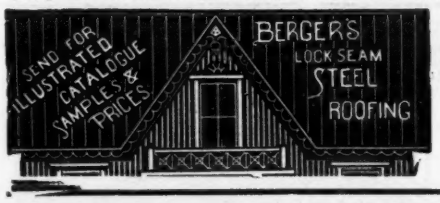

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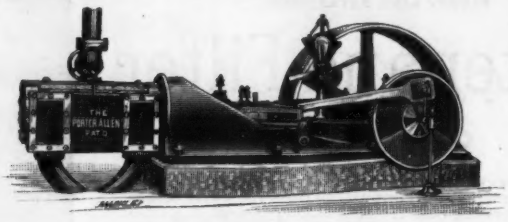

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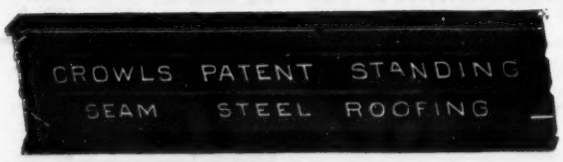

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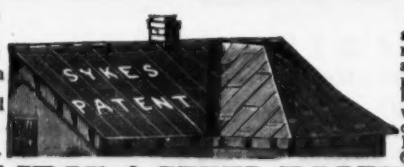

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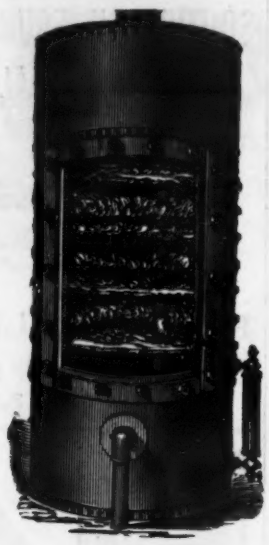

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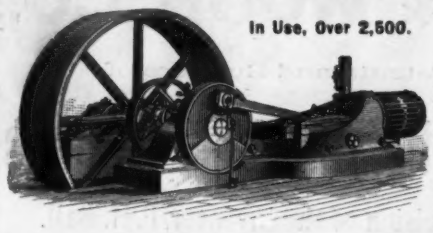

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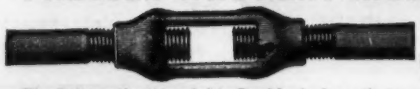

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